Established 1916 as
THE OIL WEEKLY

WORLD OIL

SPECIALIZED FOR EXPLORATION, DRILLING,
PRODUCING OPERATIONS AND MANAGEMENT

NOVEMBER, 1954

Gulf Publishing Company

New Automatic Production Controls

Production Section

Subscription Price $3 Per Year
Price This Copy 50 Cents

UNIV. OF MICHIGAN
NOV 4 1954
EAST ENGINEERING
LIBRARY

When you want

BETTER
PERFORATING

listen to what
operators say:

"Even on tough jobs, Lane-Wells perforating gets results for me."

"Their depth measurements are on the nose!"

"They don't waste my time or theirs – they arrive on time, rig up fast, do the job and clear out of the way."

"Lane-Wells men *know* my well conditions and how to meet 'em."

"You can depend on what they tell you. No double talk, no alibis if anything goes wrong – they just make good."

"I like the careful way Lane-Wells crews operate . . . safety's a big point with me."

CAL.

LANE WELLS COMPANY

TECHNICAL OIL FIELD SERVICES

Tomorrow's Tools – Today!

General Offices, Export Office, Plant • 5610 So. Soto St., Los Angeles 58

LOS ANGELES • HOUSTON • OKLAHOMA CITY • LANE-WELLS CANADIAN CO. IN CANADA • PETRO-TECH SERVICE CO. IN VENEZUELA

Those Not-So-Small Details

Standard Oil Co. (N. J.) Photo

● Placing the measuring line over the sheave is one of the small details that mean a lot in a safe, successful cementing job. There are many parallels in producing cements to meet the wide range of conditions encountered in the oil fields today.

One of these is the ritual of cleaning and checking laboratory apparatus before each test. Every detail counts, in controlling quality to assure dependable performance, even under the highest pressures and temperatures in deep, hot wells—and in assuring resistance to sulphate action, to protect the casing against corrosion.

Careful attention to all the not-so-small details is the Oil Man's assurance of the properties needed for a first-class cementing job.

LONE STAR CEMENT CORPORATION

Offices: DALLAS · HOUSTON · ABILENE, TEX. · NEW ORLEANS · BIRMINGHAM
KANSAS CITY, MO. · ALBANY, N. Y. · BETHLEHEM, PA. · BOSTON · CHICAGO
INDIANAPOLIS · NEW YORK · NORFOLK · RICHMOND · WASHINGTON, D. C.

Select Cement to Fit the Job!

WORLD OIL

Established 1916 as The OIL WEEKLY

Vol. 139, No. 6

November, 1954

CURRENT OUTLOOK SECTION

Looking Ahead ... 75
Editor's Page ... *Warren L. Baker* 77
More Security for More People ... *Irving S. Ladimer* 78
Putting Data on Microfilm Is Fast, Accurate, Inexpensive ... *Carl Cline and Carroll F. Knutson* 81
This Is Your Safety Engineer ... *Al Reese and Cecil W. Smith* 83
Beware of Rumors! ... *Auren Uris* 85
Read Faster and Save Money ... *Mildred Hicks* 87
Employes Meet the Boss ... *C. L. Stinnett* 88
The BIG MOMENT for H. C. Teasdel ... 90
Changing Panorama ... 96
Report from the Observatory ... *Ray L. Dudley and Warren L. Baker* 100
Petroleum Trends in the U. S. ... *Cecil W. Smith* 102
WORLD OIL's Views of the News ... 104
The Month's Completions ... 110

EXPLORATION SECTION

Central Nebraska Has Good Possibilities ... *Prof. C. E. Reed* 113
Computing Weathering Corrections for Seismograph Shooting ... *E. J. Handley* 118
Exploration Ahead of 1953 ... *Cecil W. Smith* 131
U. S. Discoveries in September ... 132

DRILLING SECTION

How to Catch Well Samples ... 149
How to Plan an Insurance Program ... *John Wakefield* 151
WORLD OIL Graphies: Rotary Hose Care ... 156
How to Run and Handle Drill Pipe (Part 2) ... *Richard L. Dailey* 158
Drilling Mud Practices in Northwest Branch Field ... *Fred L. Gaye* 162
Keys to Successful Competitive Drilling (Part 2) ... *Roy A. Bobo, Robert S. Hoch, George S. Ormsby* 172
How to Do It—Drilling Hints ... 180

PRODUCTION SECTION

Producing Lease Controlled Automatically From Remote Station ... *J. E. Kastrop* 197
Water-Flooding and Gas Cycling Affected by Horizontal Fractures in Thin Reservoirs (Part 3) ... *Dr. Paul B. Crawford* 212
New Liquid Level Gage Available to Industry ... *Staff Article* 216
Bentonite Cements Proving Successful in Permanent-Type Squeeze Operations ... *B. E. Morgan and G. K. Dumbauld* 220
New Sand Control Technique for Incompetent Formations ... *J. F. Bozeman* 234
How to Do It—Production Hints ... 240

INTERNATIONAL SECTION

WAPET to Spend $40 Million in Australian Oil Search *Don Kliewer* 253
New Oil Structure Indicated in Southern Taiwan ... *Leo W. Stach* 255
An Expert Appraises Australian Oil Possibilities (Part 3) ... *Dr. Werner F. Schneeberger* 260
Cuba's Discovery Well Logs Tell Story of Echevarria 1 *Staff Article* 266
What's Happening Among World Oil Men ... 268
Interest Moves From Peru's Sechura to Eastern Montana ... *Dr. J. E. Rassmuss* 271

DEPARTMENTS

Who's Meeting Where ... 72
What's Happening Among Men in the Industry ... 280
What's Happening Among Industry Associations ... 286
Companies in the News ... 289
What's Happening Among Service and Supply Men ... 290
Trading Post ... 301
Squeaks from the Bullwheel ... 302
New Books, Maps and Movies ... 320

NEW EQUIPMENT SECTION

What's New in Equipment ... 312
New Literature ... 318
Advertisers' Index ... 322

a quick look at WORLD OIL THIS MONTH

BUSY OIL MEN: To help you put first things first, scan these time-saving digests on this and the following pages, checking ☐ those you want to read first.

CURRENT OUTLOOK ARTICLES

☐ **Larger checks for 6.5 million people** were mailed out last month as a result of the new Social Security amendment. Pensions for 3.6 million retired workers are raised. Dependents are profiting. Turn to **Page 78** for a clear explanation of a system which has been placed on solid ground for the first time sinces its enactment in 1935. **More Security for More People** ... **Irving S. Ladimer.**

☐ **Collecting data for reports** is an ever-present problem for engineers, geologists and others who must make detailed studies for their companies, their customers or themselves. See **Page 81** for an economical and fast way to collect these data. **Putting Data on Microfilm Is Fast, Accurate and Inexpensive** ... **Carl Cline and Carroll K. Knutson**

Turn the Page ➧

THIS MONTH . . .

☐ **What does your safety engineer think of you?** Based on a survey of safety experts in U. S. companies large and small, here are some of the intimate details of his work and ideals. See **Page 83. This Is Your Safety Engineer**. . . .**Al Reese and Cecil W. Smith**

☐ **Riots have been started,** banks closed and companies crippled because somebody whispered a vicious word. There's the Bogey rumor, the Pipe Dream rumor and the Hate rumor, equally dangerous to your company. Turn to **Page 85** and learn to forestall them. **Beware of Rumors!**. . . . . .**Auren Uris**

☐ **Fast reading saves money.** It costs $50 to $75 a week for an executive to read reports, memos and correspondence which cross his desk. If he can be taught to read twice as fast, a considerable savings will be realized. Turn to **Page 87** and see how Gulf Oil Corporation officials . . . . . **Read Faster and Save Money** . . . . . .**Mildred Hicks**

☐ **Let the employe know** what's going on. An employe who knows his company's functions and policies is a far better employe than one who doesn't. Beginning on **Page 88** is an article that tells how Lion Oil Company conducts its employe orientation program. **Employes Meet the Boss**. . . . . .**C. L. Stinnett**

EXPLORATION ARTICLES

☐ **Successful oil and gas development** in the Denver-Julesburg Basin of Western Nebraska has focused attention on other parts of Nebraska where there is now no significant production. The Central Nebraska region presents a number of interesting possibilities that can be tested at comparatively small per well expense. Beginning on **Page 113** is an article that furnishes an interesting geological description of the area. **Central Nebraska Has Good Possibilities**. . . . . **Prof. C. E. Read**

☐ **A big problem in seismograph work** is that the rock velocities quite near the surface are extremely variable and corrections must be made for variations through this so-called "weathered" layer. Procedures for making weathering corrections assuming curved paths are not well known. An article beginning on **Page 118** outlines a procedure for making weathering corrections for variations in the near surface seismic velocities when such velocities are not constant but uniformly increase with depth. **Computing Weathering Corrections for Seismograph Shooting**. . .**E. J. Handley**

DRILLING ARTICLES

☐ **Costly geological data can be lost** by haphazard well sampling. Those little chips of rock may contain more information than the roughneck who sacks them up realizes. The basis of any good paleo work is a good sample. How should good well cuttings be taken? A committee of the Gulf Coast Section of the SEPM presents some concrete ideas on . . . **How to Catch Well Samples**. . . . . .**Page 149**

☐ **Insurance for the drilling contractor** is explained in an article starting on **Page 151.** Some important considerations in setting up a comprehensive insurance program are outlined. Of special interest is the author's discussion of how the drilling contractor can protect himself against direct loss by physical damage and loss caused by claims of third parties. **How to plan an Insurance Program**. . . . . .**John Wakefield**

☐ **We promised you some more ideas** aimed at encouraging good operating practices. Beginning on **Page 158** is the second part of the series on . . . **How to Run and Handle Drill Pipe**. .**Richard L. Dailey**

☐ **Good mud control combined with good drilling practices** saved time and money for Sunray Oil Corporation in the Northwest Branch field of southern Louisiana. An outline of procedures as well as drilling fluid and performance is described in the story starting on **Page 162. Drilling Mud Practices in Northwest Branch Field**. . . . . .**Fred L. Gaye**

☐ **Reader response was encouraging** when the first part of this series appeared in October. Now here's the second part of a series on modern drilling technology. Designed to help drilling personnel understand the influence of formation characteristics and the fundamentals of bit design to gain maximum bit footage. Turn to **Page 172. Keys to Successful Competitive Drilling** (Part 2). .**Roy A. Bobo, Robert S. Hoch and George S. Ormsby**

WORLD OIL, published every month except semi-monthly in February and August. Entered as THE OIL WEEKLY as second class mail matter December 23, 1916, at postoffice at Houston, Texas, under the act of March 3, 1879.

THIS MONTH . . .

PRODUCTION ARTICLES

☐ **Pushbutton control of an oil field many miles away** is coming closer and closer to the realm of reality. Gulf Refining Company engineers are able to shut in a producing lease, open it up and do many other control and supervisory operations by means of high-frequency radio. This test installation at Timbalier Bay field just 60 miles south of New Orleans is paving the way for remote production controls via radio to cope with the problems of offshore operations. For details of this installation, how it works, diagrams and photographs of equipment, turn to **Page 197. Producing Lease Controlled Automatically from Remote Station**.....**J. E. Kastrop**

☐ **Performance of secondary recovery** in fractured thin reservoirs producing under a staggered line drive pattern is summarized in two phases:

- Sweep efficiencies for various fracture systems.
- Conductivities of these same systems.

This study indicates that water-flooding or gas cycling programs may be completed in fractured reservoirs in perhaps one-third the time required without fracturing. See **Page 212** for the third in a series on . . . **Water-Flooding and Gas Cycling Affected by Horizontal Fractures in Thin Reservoirs**..**Dr. Paul B. Crawford**

☐ **A new liquid level gage** is accurate in foaming wells and records liquid level movement continuously at the surface. Developed by U. S. Bureau of Mines engineers, the instrument is now available to the oil industry. Design and operation of the new device is described briefly in . . . **New Liquid Level Gage Available to Industry**.....**Page 216**

☐ **Squeeze cementing permanently completed wells** with a new bentonitic cement has proven highly satisfactory in 160 jobs. Bentonite cuts filtration loss and reduces density while calcium lignosulfonate controls setting time. Results are highly encouraging. Important, too, is the fact that less cement is required for squeeze cementing. Detailed laboratory data from the group that originally designed this new cement are presented in an article starting on **Page 220. Bentonite Cements Proving Successful in Permanent-Type Squeeze Operations**.....**D. E. Morgan and G. K. Dumbauld**

☐ **A new idea has been perfected** for handling sand problems in producing wells. It is simple, inexpensive and takes little time to treat the average well. This new sand control technique involves pumping carefully graded round grain sand into producing formations. Instead of using salt water to carry the sand into the well, either a thickened crude oil, an acid-kerosine gel may be used. How the job is performed, discussion of the type and size of sand used, carrying fluids, and some pertinent questions about the technique are presented in an article beginning on **Page 234. New Sand Control Technique for Incompetent Formations**.....**J. F. Bozeman**

INTERNATIONAL ARTICLES

☐ **Australian exploration is increasing.** This despite the dry hole which followed completion of Rough Range 1, the discovery well in that country. WAPET has earmarked $40 million for geophysical and drilling operations as activity spreads to Queensland. For a report on what's happening in Australia, turn to **Page 253. WAPET to Spend $40 Million in Australian Oil Search**.....**Don Kliewer**

☐ **Taiwan has new hopes.** An extension well in the southern part of the island also known as Formosa is producing 60 barrels a day. But more than that, it points to a new structure. For a well-rounded discussion of what the future may hold in this area, turn to **Page 255. New Oil Structure Indicated in Southern Taiwan**.....**Leo W. Stach**

☐ **More about Australia.** Favorable reef prospects lie beneath part of Australia's Bonaparte Gulf Basin, says a geological evaluation on **Page 260,** which stresses importance of the regional aspects of the problem of discovering oil on the continent. It's the conclusion of a three-part article . . . **Reef Prospects Lie Beneath Bonaparte Gulf Basin Area**.....**Dr. Werner F. Schneeberger**

☐ **Interest in Cuba has mounted** since the recent discovery well was brought in. So much so that an intensive play is expected for the island during the next year or so. To the interested oil firms and businessmen—and to the industry in general—detailed analyses of the discovery well logs hold high interest. Now they are made available to the industry. **Cuba's Discovery Well Logs Tell Story of Echevarria 1**.....**Page 266**

☐ **Test wells have been dry, but . . .** exploration work is continuing along the coastal area of Peru. Meanwhile oil interest is swinging inland to the jungle region of the eastern Montaña. For details turn to **Page 271. Interest Moves from Peru's Sechura to Eastern Montaña**.....**Dr. J. E. Rasmuss**

***turn the page for a quick look at* WORLD OIL NEXT MONTH ▸**

NEXT MONTH . . .

What is the economic outlook for Canada?

Is the newly-discovered Pembina oil field as important as it has been reported?
How fast are western Canada's natural gas reserves expanding?

What is that status of the Smiley field, Saskatchewan's first major high gravity oil field?

THIS IS CANADA. This well, drilling in a harvested grain field west of Edmonton, Alberta, Canada, is typical of the scenes to be found in the prairie provinces of Western Canada as the country's drilling activity continues apace.

Answers to these and many other questions paralleling them in importance will appear in the roundup of articles scheduled for publication in WORLD OIL's December issue—the **Canadian Issue**—which will also contain field maps and statistics upon which readers may evaluate Canada's oil and gas industry.

Special articles on various phases of Canadian activity will be featured throughout the magazine. The International Section will be devoted to a thoroughgoing coverage of current activities—including field reports and maps dealing with major discoveries and development, geophysical and exploration programs. In addition, the section will include a detailed summary of 1954 efforts and achievements, as well as plans being made for the future.

The December issue will feature an economic evaluation of Canadian activities in the Current Outlook Section and technical articles in both the Drilling and Production sections.

WORLD OIL's field men who have visited Canada have made every effort to obtain top-flight authors for this special issue—men whose positions of eminence have resulted from technical experience of many years. It is through their actual operations in Canada that WORLD OIL believes its readers can profit best—both from a general information standpoint and from an operating standpoint.

All this plus the regular features in your December issue of WORLD OIL

Specialized oil publications of **THE GULF PUBLISHING COMPANY**, 3301 Buffalo Drive, Houston 6, Texas; Box 2608, Houston 1, Texas. Cable Address: GULFPUBCO.

WORLD OIL and **THE COMPOSITE CATALOG** for the drilling-producing industry.
PETROLEUM REFINER and **THE REFINERY CATALOG** for the refining-natural gasoline-petrochemical industry.
PIPE LINE INDUSTRY for the oil and gas pipe line industry.

WORLD OIL

RAY L. DUDLEY, President, Publisher
A. L. BURNS, Vice President, General Manager

EDITORIAL STAFF

Warren L. Baker, Editor and Editorial Director; Al Reese, Managing Editor; L. J. Logan, Associate Editor; Wallace Fitzgerald, Assistant to Managing Editor; Cecil W. Smith, Statistical Editor; Philip L. McLaughlin, Drilling Editor; J. E. Kastrop, Production Editor; Don Kliewer, International Editor.

District Editors: Robert E. Spann, 250 Park Ave., New York 17, N. Y.; Gilbert M. Wilson, W. W. Wilson Building, Huntington Park, Calif., and Anthony Gibbon, Hunt Building, Tulsa 3, Okla.
Editorial Assistants: Mary Stuart Warren, Ernestine M. Furlow.
Librarian: Eunice M. Okoneski.

CIRCULATION DEPARTMENT

R. M. de Sombre, Manager.

ADVERTISING STAFF

Tom W. Nelson, Advertising Manager; Nelson Bigelow, Gene Hart, George Skelton, 250 Park Ave., New York 17, N. Y.; Bill Westfall, 1010 Euclid Ave., Cleveland 15, Ohio; H. G. Fitzpatrick, Martin Halloran, 332 S. Michigan Ave., Chicago 4, Ill.; Bill Atcheson, Hunt Building, Tulsa 3, Okla.; J. W. Curts, W. W. Wilson Building, Huntington Park, Calif.; Charles Wyatt, Clair Bryan, Jr., 3301 Buffalo Drive, Houston 6, Texas; D. S. Craig, Manager Advertising Service Department; Theodor Miocha, Limmerstrasse 31, Hanover, Germany, Foreign Representative.

•

Single copies 50 cents (except special issues). Subscription price: domestic and foreign, $2 a year; 2 years, $3; 3 years, $4.

WORLD OIL, published every month except semi-monthly in February and August. Advertising rates on application. Copyright, 1954, by The Gulf Publishing Company.

Indexed by Industrial Arts Index and Engineering Index

Looking Ahead . . .

. . . **Push button control of an oil field 70 miles away** is beyond the dreamer's stage. Much of the routine of operating a producing field can be handled completely automatically, and through the medium of high frequency radio can be done at a central control office many miles distant. With an eye toward future production problems in offshore operations, Gulf Refining Company in Louisiana now has under test such a system that shows considerable promise. The production engineer is joining hands with the drilling engineer in reducing costs and stepping up production in this costliest of all oil ventures . . . the offshore well.

. . . **Unemployment, say informed sources,** is expected to remain at 3 million for the rest of the year, with approximately 1 to 1½ million jobless being added early in 1955 due to usual seasonal winter trend.

. . . **A new "electric brain"** capable of calculating problems previously too costly in man hours is expected to speed up interpretation of data compiled by airborne magnetometers and seismograph and other prospecting crews. The computer comes up with answers to involved equations 50 times faster than a human mathematician equipped with an electric desk calculator.

. . . **In 1957 sales of gas** by utilities and pipe lines will total 74.3 billion therms (10.3 M therms = 1 Mmcf of natural gas), up 31.5 percent from 1953 sales of 56.5 billion therms, according to American Gas Association.

. . . **Industry can look for OWIU to join in the fight** for the 35-hour week, which has been carried to Congress for the first time. The American Federation of Labor's important policy-making executive council is demanding the shorter week to combat unemployment, which the AFL estimates at 5 million, or 1.7 million more than government figures show. The 35-hour week has long been a dream of the OWIU, which up to now has lacked the numerical strength to demand it.

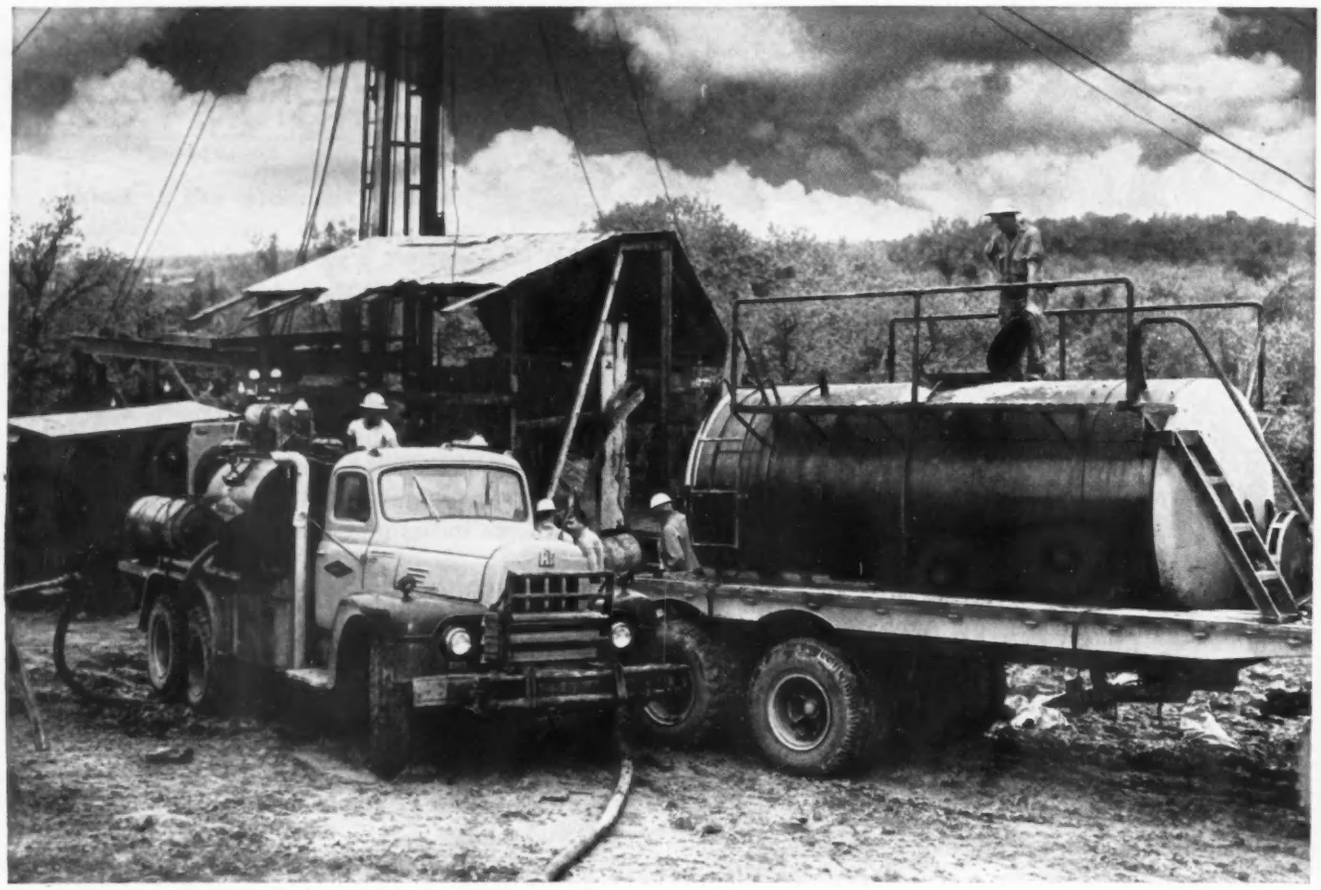
. . . **In November or December** Venezuela is expected to open negotiations on new oil concessions. New concessions probably will be offered on the same general terms as current concessions, with large integrated companies being favored in the initial new grants.

. . . **Whether the U. S. government's** shale oil experimental station at Rifle, Colo., will be abandoned is expected to be announced in January by Interior Secretary McKay, who is awaiting two reports from the National Petroleum Council based on surveys as to the plant's productive capacity and whether adequate supplies of shale gas are available.

. . . **Further field processing of gas sold** to pipe lines is in prospect. Gas companies are becoming more concerned about the liquid content of gas they buy. New contracts are limiting this content to one-fourth gallon per 1000 standard cubic feet. To meet these conditions, the producer will have to include compression and refrigeration equipment, but, will recover more salable liquids from his lease.

. . . **The scheduled Caribbean and South American on-the-spot investigation** of strategic mineral supply sources by Senator Malone and his Interior Subcommittee on Mineral Resources has been delayed, and may be called off. Reason: Conflict in dates with Senate's scheduled return November 8 to consider censure recommendation against Senator McCarthy.

. . . **Uranium is the most modern source of energy** and oil and gas companies, which are in the energy business, are expanding rapidly in uranium exploration. At a recent meeting of oil men in Denver it was disclosed that 19 of the most active firms in the development of oil in the Rocky Mountain area are now actively engaged in looking for uranium. Oil firms, familiar with land and lease problems, are naturally attracted to this field. The Geiger counter is now standard equipment for geologists and field men. Well logs are also being carefully checked for indications of uranium-bearing formations.



SANDFRAC

BOOSTED FLOW IN MARGINAL AREA

Exclusive DOWELL fracturing service raised well's output far above average for the field

A new well in a sandstone formation produced only 10 barrels of oil per day. Following a Sandfrac* treatment, the well flowed 46 BOPD. Four months later this well was still flowing its allowable 22 BOPD, while most local wells were pumping or flowing only about 8 BOPD.

Sandfrac is a Dowell-developed service designed to increase production from low-solubility formations. Basically it involves the pumping of oil and sand into the formation.

The oils used by Dowell are especially selected to be most effective. (1) These oils suspend sand ideally. (2) They retain high viscosities at high temperatures. (3) They mix well with lease crudes—may be resold by the operator.

Special Dowell-designed, high-pressure equipment, additive agents, and auxiliary treating materials also help to assure you of profitable results. Add this to Dowell's engineering know-how and you have fracturing service you can depend on.

For complete information, call the nearest Dowell station or write directly to DOWELL INCORPORATED, Tulsa 1, Oklahoma, Dept. K-13.

**Sandfrac is a registered service mark of Dowell Incorporated.*

DOWELL SERVICE

fracturing services for the oil industry

DOWELL

A SERVICE SUBSIDIARY OF THE DOW CHEMICAL COMPANY

Must Fight Gas Controls Vigorously

It is vitally important that Congress amend the Natural Gas Act so it will clearly and unequivocally exempt United States natural gas producers from price regulation by the Federal Power Commission. Remedial legislation by Congress is the only recourse open, the U. S. Supreme Court having held in the so-called Phillips gas case that all natural gas entering interstate commerce is subject to FPC price regulation at the wellhead.

There is widespread agreement in the oil and gas business that remedial legislation is a must. But this universal feeling gives no assurance that Congress will act accordingly.

Neither does the fact that Congress on two previous occasions passed such an amendment, only to have them vetoed by President Truman, give any assurance the present Congress will take similar action. There are many new faces in Congress. Furthermore, the recent Supreme Court decision will make it more difficult to get Congressional approval.

●

The only sure way of being certain that Congress will take the right step is to obtain widespread public support for such an amendment. The question must be decided by the good judgment of the citizens as a whole. Therefore, it is time that the people of this country are told the realities of the gas situation. This cannot be accomplished by silence or innocuous stilted statements. A vigorous effort will need to be made to acquaint the consuming public with the true facts and the importance of the question.

The oil and gas industry must spearhead this public information drive. The whole industry must rally behind this program, executives, independent operators, contractors, and investors alike.

A good start in this direction was made during Oil Progress Week, when many industry speakers took advantage of the opportunity to discuss the matter. This was a commendable start, but it is not enough. To this start must be added a continued program of informing the public on a larger scale.

●

The consequences of government regulation of natural gas prices at the wellhead are tremendously significant.

The first result will be federal regulation of oil and gas production on a public utility basis. In an effort to escape federal regulation, producers will withdraw large quantities of gas from interstate commerce. Natural gas exploration and development will diminish. These actions can result only in dwindling U. S. natural gas supplies. (See Page 96.) In the long run, scarcer supplies will result in higher consumer prices.

Professors, commentators and politicians have led the public to believe federal regulation will give consumers lower gas prices. To the contrary, higher prices will result. And after all, natural gas is but a very small part of the consumer's bill. Wisconsin has led the battle for federal control of gas prices. Therefore, it is interesting to note that in 1952 Milwaukee and southeast Wisconsin residential users respectively paid $1.21 and $1.44 per thousand cubic feet for natural gas, although Phillips Petroleum Company was receiving a gross field price of less than 9 cents per thousand cubic feet. The difference was due to the cost of transporting and distributing the gas, which already is regulated by the FPC. Wisconsin consumers will find they cannot benefit by reducing field prices, which amount to less than 10 percent of what they pay for gas.

●

The consequences will go far beyond the oil and gas industry. A serious question of principle also is deeply involved.

If gas is to be subjected to regulation because of its use by a regulated utility, how can oil and coal escape? They compete with gas for the same energy and heating markets. In many instances, they are used in the generation of electricity, a utility which also is regulated.

If the American people accept these developments, they will be abandoning the American economic and governmental system which is based on freedom of enterprise and a minimum of government regulation —the very basis for the American way of life.

●

This is an opportunity and also an obligation for the oil and gas industry to give the facts and consequences to the American people. Every one connected with the oil and gas business should take a vigorous part in the program of enlightening the American people.

Then, when Congress is asked to undo the Supreme Court's decision the public will know the true facts, and can be depended upon to act accordingly.

Warren L. Baker

More Security for More People

• 6.5 million Social Security checks for larger benefits mailed out.

• Dependents are profiting.

• Here's how the law works.

• Pensions for retired workers are up.

By IRVING S. LADIMER

On October 4, 6.5 million Social Security checks for larger benefits were mailed out. Pensions for 3.6 million retired workers were raised between $5 and $13.50 a month. Dependents profited too. Maximum family benefits jumped from $168.75 to $200 a month. Altogether, $319 million was paid out for September—the first month under the new amendments—$36 million more than for August.

In one sweeping measure

- Protection is granted to another 10 million workers.
- Benefits are raised for those now on the rolls and in the future.
- Higher earnings are allowed after retirement.
- Benefit rights are sustained for disabled persons.

Coverage extended. Beginning Jan. 1, 1955, coverage is granted to:

Farm operators, earning $400 a year or more	3,600,000
State and local government workers	3,500,000
Farm workers paid at least $100 by one employer	2,100,000
Household workers paid $50 in cash a quarter	250,000
Ministers, on voluntary basis as self-employed	250,000
Federal employes not under existing retirement plans	150,000
Architects, engineers, accountants, funeral directors	100,000
U. S. citizens abroad employed by U. S. subsidiaries	100,000
Home workers whether or not state-licensed	100,000
Fishing employes on all size vessels	50,000
U. S. citizens on U. S. owned craft of foreign registry	1,000

Still excluded (11 million):

Self-employed professionals (lawyers, doctors, dentists)	300,000
Armed Forces (have own system)	3,300,000
Federal workers (have own system)	1,500,000
State police and firemen under local plans	2,000,000
Low-income, casual workers, others	4,000,000

These changes create the "substantially universal coverage" recommended by the House of Representatives as fundamental to a gradual replacement of relief or assistance by insurance. By last year, Social Security covered about 8 out of 10 jobs. About 62 million came under the security umbrella.

The amendments mainly open the door to additional employes and self-employed persons, but new classes are also admitted. Of special interest to the petroleum industry are:

Professional engineers and architects. Individual consultants, experts, contractors on their own, earning at least $400 a year net, are included on the same basis as other self-employed. That is, they will report their earnings annually along with income tax information, paying 1½ times regular tax rates. These technically trained men, often hired by the industry on individual contract or fee basis, are now covered whether or not engaged as employes.

Similarly covered are accountants and funeral directors. Still left out are attorneys and medical professionals (MD's, veterinarians, dentists, osteopaths, naturopaths, chiropractors, optometrists).

Citizens employed outside U. S. American citizens employed by foreign subsidiaries of domestic corporations may be covered if the parent corporation agrees with the Treasury Department to pay the combined employer-employe tax for all the U. S. citizens employed by the foreign agency. Previously, only citizens abroad working for American employers were protected. Now, at the option of the U. S. firm, citizens working for foreign subsidiaries may also be included. About 100,000 may benefit.

This amendment is beamed at American firms which must operate through subsidiaries set up under laws of foreign countries, but employ Americans. These citizens are closely tied economically and emotionally to the U. S., intend to return and expect equal treatment. It will now be possible to cut out separate plans, create equality and ease hiring. The double tax is needed since U. S. cannot levy on foreign firms. The requirement that all employes must be covered is to avoid selecting only poor risks for coverage under the system.

Citizens on American craft of foreign registry. Although the 1950 amendments covered most U. S. citizens working outside the States for American employers, citizens working on or in connection with vessels or aircraft of foreign registry were not brought in. The new law closes this gap, and particularly benefits industries owning tanker and similar vessels and international air cargo craft.

A combination of four new provisions in law makes higher benefits possible

Benefits raised and rights liberalized. Higher benefits are possible by a combination of four new provisions:

• The dropout. Under the old law, average monthly earnings on which the benefit was calculated was pulled down by poor or no-income periods. The amendments will raise the average monthly wage by ignoring or "dropping" up to five years of lowest earnings. Take a worker whose average was $100 a month over 15 years, of which suppose five were low or no-earning years because of unemployment, sickness, or work in non-covered industry. He might now use a ten-year average boosted to about $120. His benefit would jump from $60 to $62.50 a month, and from $90 to $93.50 for himself and wife.

Under the old law, without the dropout, his benefit would stand at $55 and $80, if married. The dropout applies to those now registered (if they have six quarters of coverage after June, 1953) as well as to those newly covered. In fact, without this change, newcomers would be under the handicap of counting months during 1951-54 (in which they probably had no covered earnings) in computing their average monthly wage.

• Earnings base. As of January, 1955, earnings on which benefits and taxes will be figured will be raised from $3600 to $4200 a year. About 20 million people are expected to get additional credit by counting more of their wages. In 1953, almost half of the regularly covered men workers had earnings of over $4200. The worker with maximum creditable earnings will be able to get a benefit up to $108.50; the top under the old law was $85.

• Improved formula. As a further break for low-income and intermittent workers, the new benefit equals 55 percent of the first $110 of the average monthly wage ($100 under the old law) plus 20 percent (instead of 15) of the next $240. Previously, since just $3600 of annual earnings were creditable, only $300 monthly earnings could be counted.

Even with these increases, benefits for those who average earnings of $350 a month will represent less than than a third of prior earnings; for workers in the lowest brackets, new benefits will come to over half total earnings.

The new law hikes benefits for the 6.7 million current beneficiaries by applying the new formula, giving at least $5 in every case. The minimum (for the worker or survivor) becomes $30 and the maximum, $98.50, computed on the previously allowable maximum monthly wage of $300. Pensions for dependents and survivors are likewise increased, with the top moving from $168.75 to $200. The lump-sum death payment remains at three times the worker's benefit, but not over $255 . . . a modest sum to meet special costs of last illness and death.

The maximum monthly retirement for a single worker of $108.50 under the new law is equivalent to the income on $32,500 at 4 percent. The benefit of $162.50, for worker and wife, would be equal to $48,000 at this interest.

• Eligibility. Benefits are available to workers and survivors only if the wage record shows some substantial attachment to covered employment. A worker is fully insured after 40 "quarters of coverage. A "quarter of coverage" is a three-month period (January-March) in which at least $50 is earned in employment counted under the Social Security Act. Under the old law, he was also insured if he had coverage quarters (but not less than six) equal to half of the period between 1950 and age 65, or death if earlier. Primarily for newly-admitted groups who might have no prior coverage, insured status is given if all the worker's quarters (but not less than six) after 1954 and before 65 or death, are "covered." This transition applied until 1959, since any newly-protected individual working continuously after 1954 would be insured under the old rules.

Also, widows over 65 who have not qualified because their husbands had insufficient coverage, will get pensions under new eligibility rules. If her husband died before September 1, 1950, and had acquired at least six quarters of coverage, she will get some benefits. Checks to widows began in

Worker and Family Benefits Are Increased

Average Monthly Earnings	Monthly Benefit Retired Worker		Monthly Benefit Retired Couple	
	BEFORE	NOW	BEFORE	NOW
$40 or Less	$25.00	$30.00	$37.50	$45.00
$50	27.50	32.50	41.30	48.80
$100	55.00	60.00	80.00	90.00
$150	62.50	68.50	93.80	102.80
$200	70.00	78.50	105.00	117.80
$250	77.50	88.50	116.30	132.80
$300	85.00	98.50	127.50	147.80
$350 or More	85.00	108.50	127.50	162.80

Present Pensioners Profit

WORKER		WORKER AND WIFE		WIDOW, PARENT, CHILD	
Old Law	Amendments	Old Law	Amendments	Old Law	Amendments
$25.00	$30.00	$37.50	$45.00	$18.80	$30.00
40.00	45.00	58.40	67.50	30.00	33.80
55.00	60.00	80.00	90.00	41.30	45.00
70.00	78.50	105.00	117.80	52.50	58.90
85.00	98.50	127.50	147.80	63.80	73.90
....	Up to 108.50	....	Up to 162.80	....	Up to 81.40

Ceilings on earnings after retirement will be raised after this year

October, retroactive one month. Widows must file at Social Security offices to get payments.

Higher earnings after retirement. After January 1, 1955, you will be able to earn as much as $1200 and still get benefit checks each month of the year. Under the old rules, a month's check was forfeited whenever earnings exceeded $75. Self-employed beneficiaries lost pension checks on earning $900; now, they, too, will be allowed $1200. But, the $1200 includes earnings from any type of work, whether or not counted towards Social Security, but not income from investment, pensions, insurance policies, royalties. Another concession: You can enjoy earnings without limit and still get benefits after age 72. It was age 75.

If you make over $1200, the new law still lets you keep pension checks for any month in which you do not earn more than $80 in wages or income from "substantial services" from self-employment. If you earn less than $1200, say $300 a month for three months, you lose no checks each month.

On the other hand, if you do earn more than $80 and work in all months during the year, you will get monthly checks, depending on the total you earn for the year, for example: $1200 or less, 12 checks; $1520-1600, 7 checks; $1920-$2000, 2 checks; $2000 and up, no checks.

If a retired worker is disqualified from getting benefits because of extra earnings, no checks will go to his dependent wife or child. If the dependent or survivor works, however, only that benefit check is lost. Incidentally, the rules apply to "covered" work outside the U. S. and to non-covered work abroad. For the latter, benefits are withheld in any month in which the pensioner under age 72 works at least seven days a month.

Benefit rights of disabled preserved. Under the old law, a worker's rights and benefits might be cut down or cut out entirely if he had extensive disability before retirement or death. Now, if you are disabled for a long siege, you can apply to have your earnings record "frozen" while unable to work. The freeze like a "waiver of premium clause" in an ordinary insurance policy means that the no-income stretch will not be counted, so that average earnings will not be reduced and eligibility will not be impaired. The "freeze" rule is good for those now on the rolls too, if they were disabled before 65 and still are incapacitated on Jan. 1, 1955. Benefits will be refigured beginning next July.

The rules are simple, but significant:

- You must be totally disabled. That means unable to do work because of physical or mental illness, disease or injury and likely to be "out" for a indefinite period. After six months, you can apply to have your record frozen.

- You must have had 5 years of work out of the 10 before disability and 1½ out of the 3 immediately before the onset.

These rules are intended to restrict the rule to bona fide cases and to those with genuine record of long and recent "covered" employment.

Disability freeze rights are given only on application. This can fully cover a disability already started, if filed by July, 1957. After that, applications can go back only one year.

In addition, the disabled individual can use the new "dropout" rule to further increase his benefit, if he has had sufficient regular employment. Survivors will also have the benefit of the disability rule, if the worker qualified for the "freeze" before he died.

In general, decisions as to whether the disability qualifies will be made by state vocational rehabilitation agencies. This contact will encourage restoration and rehabilitation to get people back to gainful work—the true basis of security. The rule that the freeze applies only to impairments that are expected to be long continued does not conflict with the idea of immediate rehabilitation, since the duration refers only to length of disability and is not a prediction of inability to work. Anyone capable of work would not qualify as disabled, even if chronically ill.

Taxes. Employers and employes will continue to share equally the costs of Social Security, at these rates:

Years	Rate on Each
1954-59	2%
1960-64	2½%
1965-69	3%
1970-74	3½%
1975 and after	4%

Self employed will pay 1.5 times these rates.

These rates apply to $4200, not $3600 as previously, or a top of $84 a year on each, instead of $72. Tax on workers is withheld regularly from the whole paycheck. If you make $8400 a year, for instance, the 2 percent tax will extract $84 by June, 1955, and so relieve you for the second half of the year.

Self employed, as at present, will pay their tax—now a minimum of $126 annually along with income tax.

The rates set are intended to keep the program self-supporting, but it is recognized that the liberalizations costs may in the long run not be met by the tax schedule. Congress, however, has been consistently prudent when tax increases have been suggested. Changes in economic conditions and even in the psychological and philosophical attitudes towards work in old age (which may reduce applications for benefits in 65-72 year span) may surprise the economists and actuaries, so that solvency may not be a real problem for many years.

Note, however, that Congress added a clause to the new law requesting the Secretary of the Department of Health, Education and Welfare (which administers the Act) to study the possibility of increasing the $30 minimum benefit to $55, or even $60 or $65. While this might, as hoped, pull most of the poor off the relief rolls, it would further expand costs.

And the idea of benefit payments during disability, which is compromised in this law by the "freeze" rule is not yet licked. So, the program has still room to grow. —**The End**

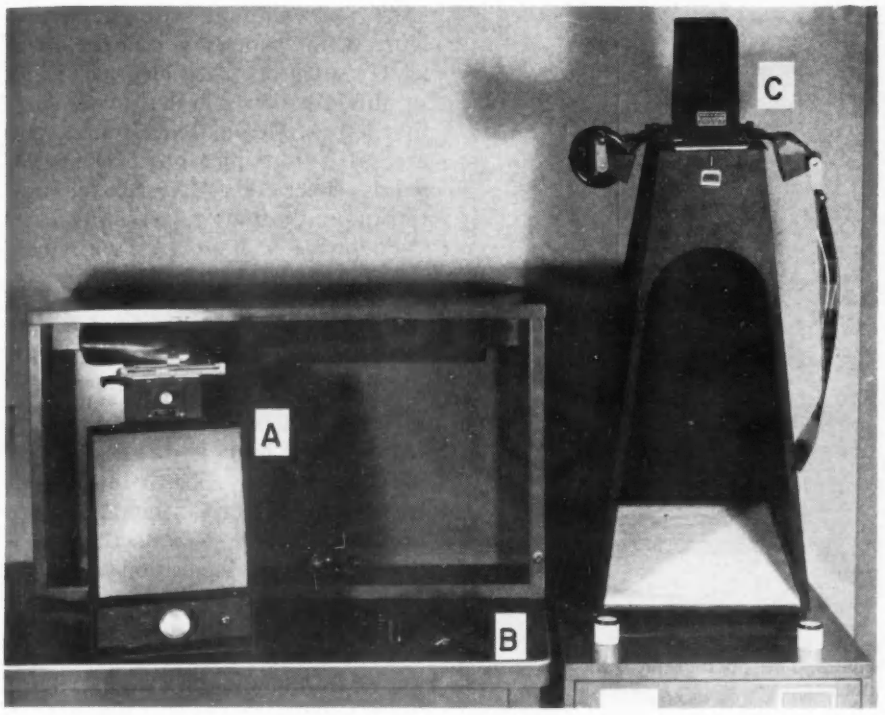


Fig. 1—Microfilm reading aids: A. microcard viewer; B. Hand lens and strips of microfilm; C. microfilm reader.

Putting Data on Microfilm Fast, Accurate, Inexpensive

Collecting information for reports can be a problem. On-the-spot microfilming has proven it can make the task easier.

By CARL CLINE, Associate Librarian, and
CARROLL F. KNUTSON, Reservoir Engineer,
Continental Oil Company, Ponca City, Okla.

COLLECTING DATA for preparation of reports is an arduous task, familiar to engineers, geologists and others whose lot it often is to prepare detailed studies for their companies, their customers or themselves.

But now, a rapid, accurate, inexpensive, and convenient method has been devised and proved through use —on-the-spot microfilming.[1]

The equipment can be carried easily in a brief case.

• **A 35 mm camera and accessories.** The single lens reflex type is the most convenient for this work, but almost any type can be used satisfactorily. The camera lens is important. A good lens with a maximum aperture between f/3.5 and f/4.5 is adequate for taking illustrative pictures under most lighting conditions, and provides good resolving power for microfilming.

Unless lens resolving power information is available, the lens selected should be tested by a lens specialist before purchase, or checked by the buyer[2,3] if a specialist is not available. If a well corrected lens with a resolving power in the order of 90 lines/mm cannot be obtained with the camera selected, such lenses can be obtained from optical companies.

• **Light meter.** The one purchased should be of the photoelectric cell variety with an incident light attachment. The incident light readings may be used directly to calculate exposure times for microfilming.

• **Tripod and head.** This equipment should occupy a small space when telescoped for storage (15 inches or less) and should form a stable camera base. The tripod should have a positive lock and should tilt about 90 degrees from horizontal and rotate 360 degrees.

Film cost and operational speed. Cost of all 35 mm. film is low (see Table 1). Good microfilm, as well as illustrative pictures, can be made with standard fine grain negative materials.

Approximate exposure time for the various types of film, with the lens set at f/8 and with average office lighting, also are listed in Table 1. For very light blue ink or faint pencil writing, the exposure should be decreased.

Speed of operations is an important factor (see Table 1). Two 8½-inch by 11-inch pages can be photographed in each exposure. Advancing the film and winding the shutter requires from two to five seconds. Placing data to be recorded under the camera is the most time-consuming phase of microfilming.

If the data are bound or in a loose-leaf book and in correct chronological order, only a few seconds will be required to turn the pages for each exposure. If the data are of various sizes, the collector may have to adjust and refocus the camera after each exposure. That, of course, may re-

TABLE 1

35 mm Film	Resolution Lines/mm	Quality of Copy	Cost $/Double Frame Exposure	Exposure Time f8 and Office Lighting (in seconds)
Microfilm	175	Excellent	$0.007+	2.0
Fine Grain Film Positive	120	Very Good	.004—	8.0
Superior No. 2	80	Good	.008+	1.0
Plus X	95	Good	.008+	0.7

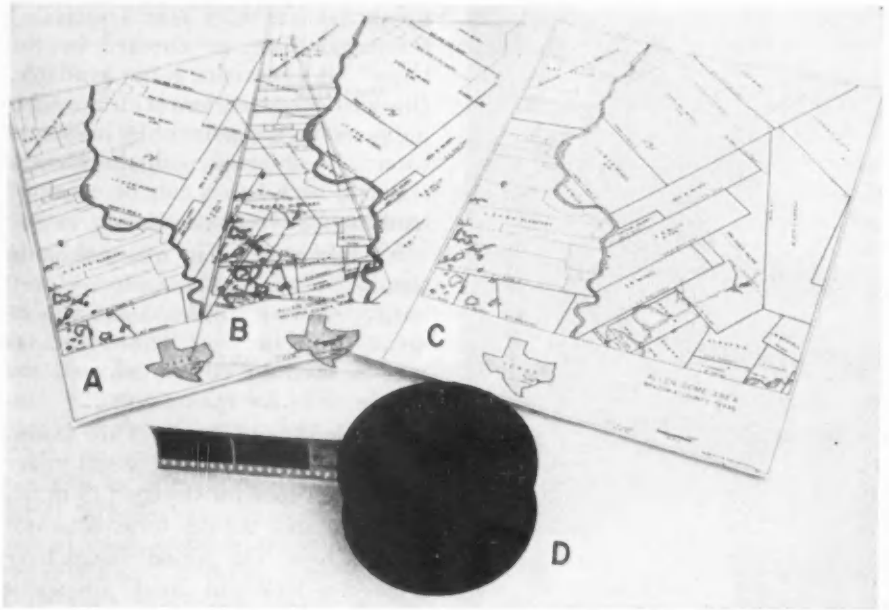


Fig. 2—Some methods of utilizing microfilm: A. positive print; B. film positive; C. Ozalid made from film positive; D. roll of microfilm. This photograph is an enlargement made from a 35 mm negative.

quire several minutes, just as the procedure of setting up the camera and changing film after each 36 exposures.

One example of the speed available through this operation. Thirty 11-inch by 17-inch pages of bound production data was recently microfilmed in ten minutes—from beginning to end.

Use of data. After the data have been collected on rolls of film, they may be utilized by one of several methods:

- If retabulation or partial abstracting is necessary, the film may be read with a microfilm reader, a viewer or magnifying glass (see Figure 1).
- If portions of the data are to be used frequently, an enlarged positive print may be made.
- If a number of copies of a part of the data are required, an enlarged film positive of the print may be made and Ozalid copies printed from this positive (see Figure 3).

Storage and retrieval. Microfilm's usefulness as a depository for large amounts of information presents a problem—how to retrieve any particular variety of data from the files. At least two methods which are satisfactorily in use are:

- If the microfilm collection is small, it is convenient to file both microfilm and paper photographic prints under the names of oil fields, the films being stored in card file drawers in small labeled metal containers.
- If the film collection is large, it is best to avoid use of a complex coding system. One method devised which eliminates drawbacks of a superimposed alphabetical abbreviation code and index varieties is one of abbreviating index entries to yield four-letter code words. This method is based on the fact that the letters of English words occur in the following order of frequency:

E T A O N R I S H D L F C M U
Y P G W B V K X J Q Z

An index entry is reduced to four letters by beginning with the second letter of the expression and removing all E's, then T's, A's, etc., according to this frequency order, until only four letters remain. These four letters are used infrequently in English words. Therefore, they are characteristic of the particular expression.

Following is a group of extremely similar entries and their abbreviations:

Production, gas	pucg
Production, oil	pucl
Production, water	pucw
Productivity index	pvyx
Producing gas-oil ratio	pngg

The initial letter is retained to simplify the sorting of cards into alphabetical order, if that should become necessary. The system does not produce very good separation of almost identical entries, as indicated above. However, good separation is obtained with most entries, and a good scattering of the punching pattern results.

No code book, classification system or complicated rules of abbreviation are required. The system is not perfect. But it is simple and workable.

BIBLIOGRAPHY

[1] Put Snap in Your Work! Using photographs to replace lengthy reports and long distance calls; Service Pipe Line Co., C. I. Huss, World Oil, v. 134, pp. 220-2, March, 1952.

[2] A Test of Lens Resolution for the Photographer, Gardner, I. C. Nat. Bureau of Standards Circular C 428 for sale by Superintendent of Documents, U. S. Government Printing Office at 75 cents.

[3] Photographic Optics, Greenlef, A. R.; MacMillian Publishing Co., 1950. Efficient Coding, B. M. Oliver, Bell System Technical Journal, v. 31, No. 4, pp. 724-50, July, 1952. Punched Cards, Their Applications to Science and Industry, R. S. Casey and J. W. Perry, Reinhold Publishing Corp., 1951.

—The End

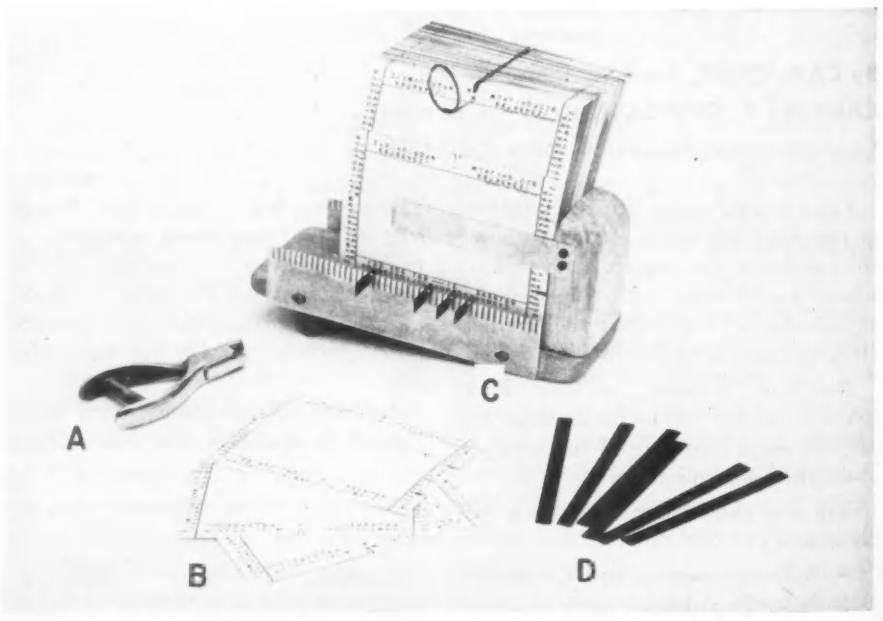


Fig. 3—Small card sorting rack. A. punch; B. punched cards; C. card sorter; D. sorting bars. This photograph is an enlargement from a 35 mm negative.

This Is Your Safety Engineer

He's a man with a varied background and a liking for people. Here are some of the intimate details of his work, his ideals.

By AL REESE and CECIL W. SMITH, World Oil Staff

This is your safety engineer.

He is 46 years old, makes $8814.60 annually, and has been in safety work 13 years.

The odds are 2½ to 1 he went to college, but it's 4 to 5 he didn't graduate. If he did win a degree, it was probably in engineering, likely chemical.

The chances are better than 50-50 he had no idea of entering the safety field at the time he left school. He detoured through one or more jobs that delayed his entry into safety but endowed him with oil field know-how or sharpened his talents for leadership. He may have been a roughneck, a seismologist, production clerk, natural gasoline plant superintendent, civil engineer, gager, or maybe even a high school coach before he drifted into safety work or was drafted into it by his boss because of a background that lets him talk everybody's language and personality that makes people want to listen.

He likes his boss, sees in him a growing awareness of the importance of safety.

He's anxious to improve the standards of safety engineering through higher goals for the present generation and better preparation for young men planning to enter the work.

This approximate composite of safety engineers was drawn from replies to a World Oil questionnaire made by 20 safety men in U. S. companies large and small. In the interest of frankness, the participants were asked not to identify themselves with their answers.

Your safety engineer believes that of all the prerequisites of his job, the most important is the ability to get along with people. This qualification he has in abundance, for he likes people, the excitement of new faces, the warmth of long friendships, and the solid satisfaction of a task accomplished in teamwork with his fellow employes. People, actually, are his job. So it follows that he would deplore the sequestering chores of the desk which mount as he advances to an administrative capacity.

Your composite engineer now spends 43.5 percent of his time in administration and 10.5 percent doing paper work. Inspection consumes 9.4 percent of his time, instruction 11.4 percent, safety meetings 10.8 percent, miscellaneous safety 8.2 percent, and all other duties 6.2 percent. The latter includes committee work with various organizations, photography, employe relations, supervisory training, public relations and travel.

Your safety engineer is one of six in his company, a figure calculated on the total number of safety men and the total number of other employes in the companies whose representatives participated in the survey.

The average is one safety engineer for every 704 employes, though the figures fluctuate widely from company to company. Whereas one firm with 1400 employes has five safety men, or one for every 280 employes, another with 3000 employes has only one safety expert. Among larger companies, the average is about one safety man for every 650 employes.

The ratio of safety engineers to total employes apparently has considerable bearing on salaries. According to replies to the questionnaire, the highest paid are those whose number in ratio to total employes is some-

What does your safety engineer think of YOU?

"I feel petroleum management is ahead of other industries in its thinking regarding safety."

This judgment of a medium-salaried safety engineer in a medium-size company is an accurate reflection of the group answer in reply to this question."

"From observation and experience in your own job, what do you think management in your branch of the industry could do toward furthering safety?"

Invited to give a strictly anonymous assessment of their management, the safety engineers agreed almost unanimously that their superiors are doing a good job on behalf of safety. But, they agreed, there is room for improvement.

Here are their suggestions:

- Give safety engineers more cooperation and less lip service.
- Work safety engineers more into operational plans.
- Sincerely demand and recognize safety achievements as important as production. In fact, make it a part of production.
- Discuss safety problems more often with lower levels of supervision.
- Set up a better system of selecting new employes; train both new and old employes in safety.
- Pay greater heed to building safety into equipment.
- Give more thought to safety recommendations before passing an opinion.
- Place the responsibility for safe working practices on line supervision.
- Set up within top management circles the mechanics or organization to check and manage safety work properly, rather than leaving this duty to others.
- Consider safety performance as an index to individual department and general operating efficiency.
- Raise the standards of safety and of safety engineers.

where near the average of 704. This suggests that pay and work load are kindred factors in an efficient safety program worked out by a careful and considerate management.

The highest-paid safety engineer participating in the survey receives $11,800 for guarding the safety of 657 employes in one of the larger companies. Of the other three receiving $10,000 or more, one is responsible for 850 employes and the others for 750 each. By contrast, one safety engineer responsible for 3000 employes is the lowest paid of the entire group at $6500, and another responsible for 2250 employes is paid $6600.

The survey indicates that the size of the company also influences salaries. Safety engineers in companies above average size of those surveyed receive an average of $9220 a year. Those in companies below average size receive $8679.

Those with heavier administrative burdens are better paid. The safety engineers who said they spend 25 percent or more of their time in administrative activity receive $9090 per year compared with $8401 for those who spend 24 percent or less of their time in this type work.

There is no apparent relationship between salaries and length of service among those surveyed.

Those who hold college degrees draw an average of $9100 a year, the others $8580. These figures cannot be considered conclusive because of the limited scope of the survey, but they do lend some additional weight to the safety engineers' own advice to young men who plan to enter the field. The majority of those surveyed admitted the value of a college background by the sheer weight of their recommendations of numerous college courses. Nearly all specified some form of engineering study. Other courses frequently mentioned were psychology, speech, dramatics, salesmanship, human relations, industrial relations and writing. Whether gained in college or elsewhere, knowledge of fire fighting and first aid is also essential.

After college, the young safety-man-to-be must gain field experience. "Without a thorough knowledge of field operating problems," declared a safety expert of 15 years' experience, "the efforts of a safety engineer would be useless."

But even this considerable background does not assure a well-rounded safety engineer. Before and after entering his life's work, the young safety engineer is advised to further develop traits which may mean the difference between success and failure. Foremost among these is the ability to get along with people. Others cited in the survey are resourcefulness; the ability to train and instruct supervisors in the benefits and importance of safety; tact; administrative ability; willingness to work; ability to arouse enthusiasm in others; and—not the least of these—salesmanship. "The name safety supervisor is a misnomer," declared one of those surveyed. "He is not an engineer, but is concerned with selling, promoting, and getting along with people." —**The End**

Errata

On Page 162 of the October, 1954, issue of WORLD OIL, mention was made that "60 percent of the tool joints in West Texas are H-90 joints." This should have read that 60 percent of the drill collar joints are this type joint. This information is based on a study made by the Straight Hole Committee of the Southwest District API Study Group Committee which surveyed the drill collar practices of 36 drilling contractors representing 221 rigs in Permian Basin. At an API Drill Collar Study session in 1952, the California representative indicated that box failures are unheard of in California. This representative advocated the use of pin connections one-half size larger than currently used in West Texas.

Beware of Rumors!

They can cause bankruptcy. Here are the three principal types—the hate rumor, bogey rumor, and pipe dream rumor. Here is how to guard against them.

By AUREN URIS, Research Institute of America, New York

WHEREVER THE WINDS of rumor blow freely—in plants and offices—they leave a trail of upset and turmoil.

Key word of a rumor may be layoff - bankruptcy - reorganization. Such sparks can lead to conflagration. The fact is, rumors can undermine the foundations of group loyalty and team spirit. Unhindered, they can destroy the team—even the ball field.

The dictionary defines rumor as "a story current but not authenticated—something believed but not proved." But that doesn't give you the true picture, the insight into the nature of the beast. You can usually nail down a lie; but a rumor is like poison gas—in the way it spreads, the difficulty of fighting it, and the harm it can do to the people in your organization.

It's this intangible quality that makes a rumor difficult to handle. The man who thinks it's easy is usually the one who does more harm than good in his efforts to counteract the poison.

Types of Rumors—Generally, rumors fall into three main categories:

. . . the bogey rumors—founded on fear;

. . . the pipe-dream rumor—based on wishful thinking;

. . . the hate rumor—a mixture of fear and malice.

I. The Bogey Rumor. The phone rang in a company president's office. It was his personnel director, obviously upset: "People are quitting all over the place, and I can't figure out why."

An investigation disclosed that a few days before, in a casual conversation, one employe happened to mention to another that he had heard the company was going to lay off 10 percent of its personnel across the board. By the afternoon, the rumor was all over the place, and instead of 10, it was now 50 percent layoff.

No layoffs were planned. But that fact didn't halt the damage.

Behind the bogey rumor you usually find insecurity. It's the man who's uncertain of the future who grabs a crisis out of the air, starts the panic words on their deadly rounds.

You might say, he sees the world through black-colored glasses. He sees in the man who has come to fix a bad floor board, the first of a wrecking crew that's going to rip down the building; a light burning overtime in the front office is taken to mean the company's in trouble.

II. The Pipe Dream Rumor—A week before Christmas, one employe told another everyone would soon be feathering his nest with a bonus amounting to 10 percent of the yearly salary.

Actually, management, as it had in previous years, declared a 2 percent bonus. The let-down—and the resentment—was terrific.

Behind the pipe dream rumor you're apt to find a frustrated individual. He craves adventure, excitement, anything to break up the routine. At the wheel of the family jalopy, he thinks of himself as a jet pilot. He daydreams, mentally acquires all the things he'd like to have—a date with his favorite Hollywood star, a million dollars, the boss's chair.

And all too frequently, it's but a step from an idle thought to an idle tongue.

Let's say someone in the department is going to be promoted. To our pipe dreamer, it's simple logic that, "When they move him up in line, that will mean promotions for all the rest of us." And he starts the juicy item through the grapevine.

III. The Hate Rumor—Mr. X, an employe of six months' tenure, has been trying desparately to make the grade. But one day he tells his boss, gruffly, that he is quitting—and promptly does.

Later it comes out that the man had been hounded by a persistent rumor that pictured him as a petty thief.

True, a number of small items had been disappearing from the men's locker room, but none of these thefts had ever been connected with the man who had quit. Nevertheless, the rumor had flourished.

Six months later the true story came out when the real thief was caught.

Who had started the original rumor? Clearly someone who, for one reason or another, "had it in" for Mr. X.

The character assassination rumor is the easiest to spread, the hardest to curb. A man's reputation can be ruined overnight. Behind such destructive whispering campaigns you'll usually find a man with a peeve—or worse, a "professional" hater. He devotes an inordinate amount of time to resenting those who are more successful than he is—or merely different.

Troublesome Twosome—Regardless of the type of rumor you're dealing with, it takes at least two people to start the eight-ball rolling.

First comes the rumor starter. He's the one who makes up the rumor out of whole cloth—or, psychologically speaking, out of the mental projections of his insecurity, his day dreaming, or his pet hates.

Next in line comes the rumor repeater. He parrots the tale the rumor starter has built up. Unfortunately, most of us fit into this category.

Generally, there's no malice behind the passer's talk. But that doesn't lessen the harm he can do. Keep these two links of the grapevine chain in mind when you set out to try to counter-act rumors.

How to Fight a Rumor—Fighting a rumor can be a tough, heart-rending battle. In some cases, you can't win. There are some things you can do, some things you can't, and some you shouldn't, when destructive rumors appear on the scene.

Here are some of the steps which can help you, in certain instances, root out rumors. But they are not fool-proof measures. Sometimes they will work, sometimes they won't. Nevertheless, they are worth considering when you're up against a rumor situation:

• Fight it or forget it? When the story comes to your attention, the first thing you have to do is to decide whether or not it's the kind of rumor you have to fight. There are a few

simple standards by which you can judge:

. . . Are people taking it seriously? Sometimes a story gets around without anyone taking it very much to heart. It may even be a gag—which will be accepted as humor, as long as tempers don't get short.

. . . Is anyone being hurt? Funny or not, if an individual is under attack, you may have to take action to protect him.

. . . How widespread? Some rumors spread all over the place, others are restricted to a small group. The extent to which a rumor has spread is another factor in helping you judge whether you need to take action.

• What are the facts? Your first step is to learn the actual facts, if possible. The nature of the rumor itself usually tells you where to look. A rumor about John Jones, for example, means that he would be the starting point of your investigation.

• Should you play private eye? It's unwise to try to play detective in handling rumors. A better bet is to call in the key people involved and talk to them either individually or collectively, on a cards-on-the-table basis.

• What's your strongest weapon? Frequently, the simple truth is the best way to give the lie to a rumor.

You can usually stop a rumor cold by—

. . . convincing your people of the falseness of the story;

. . . making them recognize the harmfulness or unfairness of the story.

• Can you straighten out a distortion? Here's a rumor that was brought to one executive's attention:

"We've heard that Mr. X is going to be fired because the company thinks he's too old. That's unfair and we're circulating a petition to protest the move."

Frequently, it's the half truth that causes the most trouble. You may be able to set the record straight:

"Yes, it's true that Mr. X is leaving, but the reason is that he's incurably ill. Don't you agree that under the circumstances it would be best if the whole thing were kept quiet?"

• Can you track down the source? Don't think it's easy. The trail to the den of the rumor starter is lined with pitfalls. More often than not, as you try to follow the trail, you come to a dead end:

"I heard somebody in the lunchroom talking about it, but my back was turned and I didn't recognize his voice."

But try this approach, based on your knowledge of the three types of rumors.

First, label the rumor—bogey, pipe dream or hate variety. Check your last source, and find out his source. Then, since you've labeled the rumor, you have an idea as to the kind of individual who's at the bottom of it.

Even where the trail ends in a cloud of dust, it still may be possible to spot the offender, if you know your people well enough. In the hate rumor, which is essentially the character assassination of one Don Doakes, let us say, you know where to look if you know some of Don's personal enemies.

But—don't be too quick to pin the blame on any individual. In 50 percent of the cases you'll probably be accusing an innocent person. And even if you have the right man, you may have no proof. Your most effective strategy may be to get close to the source, get close to the rumor starter, and then quit. If he can take a hint, you may have permanently ended his rumor-mongering.

Handling the Rumor Starter—When you succeed in tracing a rumor back to its source, your best strategy is generally indirect, long-range. The chief advantage in spotting the rumor monger may lie in preventing a next time.

Where you determine, for example, that your rumor starter is operating from a basic insecurity—via the bogey man type of rumor—you may be able to make the moves that can relieve some of the burden of anxiety that starts his fabrications.

If the culprit turns out to be a pipe dreamer, you may conceivably be able to bring him down to earth, start him on the way to the realistic accomplishment of his goals.

If you find you have traced a "hater" at the end of the line, your problem is a little different and a little tougher.

He's apt to be the one with the most serious emotional difficulty. Chances are you won't be able to change the way he thinks or the way he feels.

Yet a heart-to-heart talk can sometimes do the trick. Don't lecture him—although with some individuals, pointing out the unfairness of their actions, may hit home. If you get no sign of agreement or cooperation, you may have to put it to him squarely:

"We can't stand for that kind of attitude around here. It creates ill feeling and interferes with getting the work done. If this continues, we'll have to take action."

The plain fact is, malice and evil intentions can't be permitted to flourish on the job. Too much is at stake. You won't ever want to act in haste or anger. But don't forget you have at your disposal disciplinary tools, from a stern rebuke right up to a dismissal.

Are You to Blame?—Investigation has repeatedly proved one outstanding fact: "Rumors are a substitute for news."

A rumor is often an answer to a question that springs up in the public's mind. As one study of rumors in a prison camp showed, the less news, the more rumors.

Rumors rule in an atmosphere of misinformation or the lack of information. The best method for nailing a rumor is not to let it happen in the first place, to have your people so well informed that they themselves are able to separate the truth from the lie.

Your Long-Range Policy—To put the chill on the sour grapevine calls for two-way communications—from you to your people, from your group back to you.

Specific communications procedures and contacts like these help make your organization rumor-free:

• Give your people advance notice of any contemplated changes whenever possible. This effort should be carried right down to the department level. Your supervisors, for example, often carry out routine changes. These too should be preceded by an announcement or explanation to departmental personnel.

• Keep your people informed of progress—company sales, finances, expansions, new products, and so on, as much as possible.

• Encourage your people to bring their questions to their superiors. This brings with it a double dividend: any free-floating rumors will reach you or other staff members at the same time it circulates in the group.

Finally, remember that the strongest—or weakest—link in the chain is the individual. The employe who's well informed, who has reason to trust you, and knows he can depend on you for the facts, is practically immune to the deadly germ. He's your strongest bulwark against ruin by rumor.

—The End

INDIVIDUAL READING PROBLEMS being worked out. Left to right, T. L. Lewis, J. S. Trail, Jr., R. A. Payne, and E. P. Hubbard, all of Gulf Oil Corporation, are learning to . . .

Read Faster and Save Money

Brief course in Gulf Oil's offices teaches executives to read twice as efficiently as average adult.

By MILDRED HICKS, Student Services Division, University of Houston, Houston

A SHORT COURSE of instruction in their own offices has taught a group of Gulf Oil Corporation executives to read with twice the efficiency of the average American adult.

The average American reads at 225-250 words per minute with 75 percent comprehension. His reading efficiency score, found by multiplying words per minute by percent of comprehension and dividing by 100, is 170-185. Yet most of these average Americans can be trained quickly and easily to read from 50 to 100 percent faster with ever greater comprehension.

Business executives spend an average of two to three hours a day reading reports, memos, correspondence and technical data. If their time is worth $5 an hour, it is costing from $50 to $75 a week for each of them to read the material that crosses his desk. And if this reading time were cut in half, the savings would be substantial.

These facts prompted J. S. Trail, head of Budget and Statistics and Organization in the Gulf Production Division of Gulf Oil, to ask Dr. A. J. Pellettieri, director of the University of Houston's Reading Clinic, to conduct a reading program in the Gulf Building.

Dr. Pellettieri suggested that the top personnel of Gulf be invited to participate, since these employes, he felt, would profit most from training. The two agreed on a later planning session which was to include John Ligon, Jr., coordinator of Employment Information, and Ross Carr, coordinator of Safety and Training.

Fourteen top production men accepted Gulf's invitation to become "Better Than Average Readers," although four dropped out before the course was completed. Graduates were E. P. Hubbard, W. A. Shellshear, N. C. Simpson, Walter F. Rogers, N. B. Martin, Tom Lewis, C. B. Hussey, D. S. Scott, S. O. Tostengard, and Trail, who decided the course would be as good for him as for any other employee.

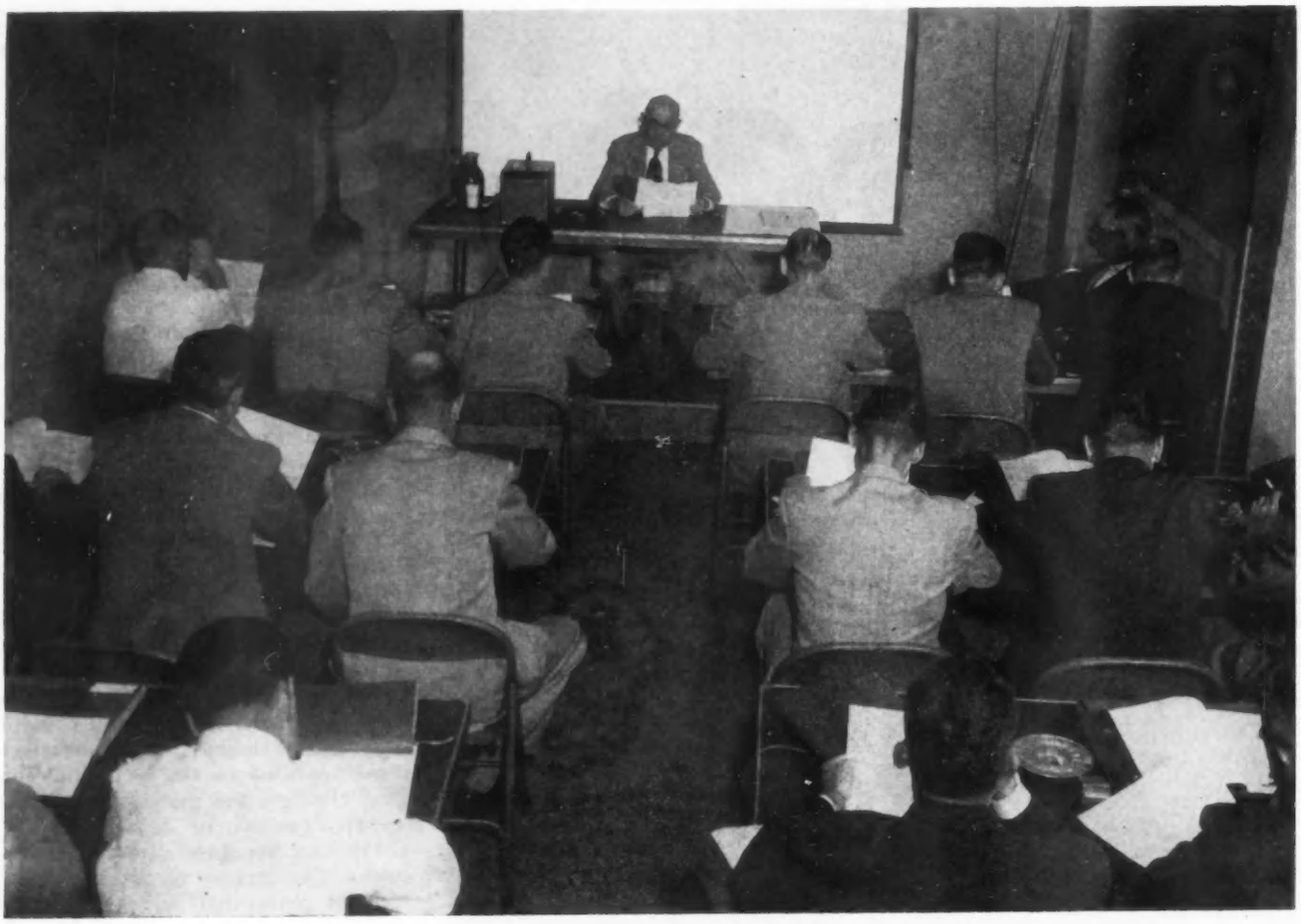
While the class was being formed, facilities were being prepared for it. A projection room for showing films and film strips, and a laboratory-classroom, adequately lighted and containing tables, chairs, and bookshelves, were provided in the Gulf Building. Dr. Pellettieri then moved in his equipment; "pacers" or accelerators for controlling the speed of reading, flash meters for increasing the speed and span of perception, and a library of popular and technical books and magazines, in addition to the reading films.

Experience had taught Dr. Pellettieri that a flexible schedule for these busy men, many of whom traveled extensively, was more workable than the strict class schedules maintained on the University campus. Accordingly, he arranged to provide two lab periods per week from 3:30 to 5:30 p.m., and one weekly theory session from 4:30 to 6:30 p.m., to extend over a 12-week period. Each class member was then expected to attend one of the lab sessions (though he might attend both), and a portion of the theory session each week—at least 45 minutes at his most convenient time.

Dr. Pellettieri conducted the theory classes, and assigned Mrs. Elizabeth MacNaughton, Reading Clinic staff member, to supervise the laboratory work.

Read for Content—The first class meeting was used to orient members in the basic principles of reading techniques. It was determined just how effectively each member was presently reading; speed, comprehension, amount of recall, and number of eye fixations per line. Because physiological factors strongly influence reading ability, members were also screened for physical disabilities, particularly

Continued on Page 95



SALES ORIENTATION is directed by A. F. Reed, vice-president in charge of sales for Lion Oil Company. Meetings, presided over by company directors, are held quarterly.

Employes Meet the Boss

A worker who knows how his company operates is a valuable asset. That's the theory Lion Oil Company has based a training program on.

By C. L. STINNETT, Assistant Personnel Director,
Lion Oil Company, El Dorado, Ark.

LION OIL COMPANY'S employe orientation program, inaugurated less than a year ago, has achieved signal success. Some unusual aspects of the program may be of interest to professional trainers because many of them have experienced the unfortunate necessity of having to sell personnel training without having unqualified top management support and approval. Lion's orientation program, however, was first sold to top management.

Lion's program differs from the conventional type of industrial training in these respects:

- It was established by a resolution of the company's board of directors.
- Directors themselves participate in the conferences.
- Each division and department develops the subject matter relating to its operations and presents it through its managers and supervisors. The training specialists, therefore, act only as coordinators, consultants and planners.

The present management set the stage for this recent training and development program nearly 25 years ago when it recognized that the company's greatest asset is its people. The need for a planned and organized program of employe development became increasingly apparent as the company's activities became more widespread and diversified.

The program was initiated by a policy advisory committee which was established by the board of directors early in 1951, and which in itself is somewhat unique. Composed of 21 members chosen by the president

from the middle-management group, the committee's objectives are as follows:

- To study and discuss all present policies in the light of current conditions in the company.
- To study and discuss new policy proposals as may be suggested from time to time by the board of directors, or as may come to the committee's attention through other appropriate channels.
- To transmit recommendations to the president of the company preparatory to presentation to the board of directors.

The chairmanship of the committee is rotated among the members but the director of industrial relations acts as a permanent secretary and, on projects involving personnel and industrial relations matters, his staff acts in an advisory capacity and does required research.

Preliminary work on a project is done by a subcommittee which presents its completed studies before the full committee for discussion and final consideration. Recommendations of the group concerning any policy, plan or procedure are transmitted to the president for review and presentation to the board of directors for final action.

It was this group of middle-management men that, while studying an entirely different proposal, conceived the idea of the orientation program. They recognized that with the tremendous growth experienced by the company in recent years' operations had become more widespread and in many instances employes had had little opportunity to learn anything of the company's activities outside their own division. The need for greater dissemination to employes of information regarding overall company operations and policies was recognized.

Their first step was to make a comprehensive study of the training and development programs of numerous companies, particularly those in the petroleum and chemical industries. Then, after further study and investigation, committee drafted a recommended policy for an employe orientation program and submitted it through the president to the board of directors. Recommendations of the committee were adopted verbatim by the board.

This direct and wholehearted support by top management is probably the greatest contributing factor to the success of the orientation program, particularly because this same interest and backing carries over into the presentation of the program itself.

The prime objectives of the program are twofold.

- To provide a general understanding of overall operations of Lion Oil Company, including a knowledge of the functions of each department and the relationship between departments.
- To acquaint participants with key personnel of each department and with company officials with whom they normally have little contact.

The policy provides for four series of conferences each year at three-month intervals. The time allocated to each series is three weeks, five days a week, so that 120 hours of carefully-planned study and discussion are provided for each program.

Number of participants is limited to 20 for each series and the policy specifies that subject matter "shall be presented by a director for departments under his jurisdiction or any person designated by a director to make such presentation." The management of the program, however, is assigned as the responsibility of the director of industrial relations "in consultation with representatives of other company departments."

When the project was approved, the director of industrial relations called together designated representatives to draft the outline of the first orientation program. Subject matter to be included, order of presentation, time to be allotted to each department and other related matters were determined by this group in the conferences which followed.

Not only is the program planned by all the departments involved but the actual presentation of the program is handled by department managers and supervisors. The so-called training specialists are merely the consultants and coordinators. In this fact lies another of the unique aspects of the program.

The planning having been done, 20 participants held the first quarterly program on Jan. 12, 1953. Members included supervisory and technical personnel who represented a cross-section of the company's operations.

T. M. Martin, company president, opened the first session. He recited

About the Author

CHESTER L. STINNETT, assistant personnel director of Lion Oil Company, joined Lion March 15, 1949. He formerly was with Shell Oil Company in Tulsa, as attorney and later personnel and industrial relations manager. In his present assignment, Stinnett is in charge of group insurance, retirement plan, sickness benefits plan, all employe and supervisory training, and industrial relations research.

He was born in Oklahoma, receiving his high school education at Enid, Okla. He attended the University of Oklahoma, receiving a B.S. degree in 1931 and an LL.B. degree in 1934. He is a member of the Oklahoma Bar Association, American Bar Association, as well as a member of several training committees of the API. He is also a member of the American Society of Training Directors.

TABLE 1

(Lion Oil Company's orientation program as presented by company function and the time indicated for each department.)

Management and Company-Wide Functions	Time Allotted
Top management and overall company structure; legal department; public relations	½ Day
Insurance; treasury and tax matters	1 Day
Industrial relations	1 Day
Research	1 Day
Sales Functions:	
Advertising	½ Day
Petroleum sales	½ Day
Chemical sales	½ Day
Credit	½ Day
Traffic	½ Day
Technical Functions:	
Petroleum:	
Land	1 Day
Geology	1 Day
Production and pipe line	2 Days
Refining	2 Days
Chemical:	
Chemical plant	2 Days

the historical background of Lion Oil Company, gave a briefing on the company's organizational structure, presented an outline of the company's basic policies and objectives, and discussed the company's future plans.

Taking part in this first program were about 80 different speakers or conference leaders. In addition to Martin, they included other members of the board of directors, department heads, specialists, engineers, chemists, researchers, and a number of operating supervisors. These various conference leaders or speakers utilized modern media of communication including visual aids in the form of charts, maps, flannel board, and motion pictures. Field and plant visits were an integral part of the program.

At the outset, the conferees of this first series were told that their evaluation and suggestions regarding possible improvements in the program could be of material benefit in the planning of later series of conferences. They were asked, therefore, to become members of the planning group by making notes as the conferences progressed. They were told that they would have opportunity to use these notes to give constructive criticisms and suggestions for improvement at an evaluation conference of their own to be held at the conclusion of the series.

Accordingly, the orientees held their evaluation conference and suggested many excellent ideas for its improvement. They said they had gained knowledge and information of value to them in the performance of their regular duties.

A typical comment made by one of the conferees was: "Specifically, the orientation program has shown me that: My personal problems within the company are not unique and may be solved; I believe I would have been worth more to the company if I could have seen it six years ago as I have seen it during these conferences."

The second program, which began April 6, was better arranged and more effective than the first as a result of the suggestions and criticisms by the participants in the first series. Visual aids have been standardized and are projected on a built-in screen in the new conference room, which has now been provided in the head-

Continued on Page 95

The Big Moment . . .

for H. C. Teasdel

The Big Moment for H. C. Teasdel of New Orleans, president of The California Company, a wholly-owned subsidiary of Standard Oil Company of California, might have been the desire to know corporation people—a desire that led a Salt Lake City sports writer to give up a newspaper career to study accounting.

Or it might have been the day, in 1920, when a Navy transport put in San Francisco Bay and the supply officer, about to be released from active duty after World War I, decided he'd like to spend a year or so in California.

Or it might have been the kindness of a corporation executive toward a rather brash young man, applying for a job.

Teasdel would pick the latter.

The executive: J. H. Tuttle, then general comptroller of Standard Oil Company of California. The young man: Ensign Teasdel, USNR, former sports editor of the Salt Lake City Herald-Republican.

"He just impressed me as a swell guy to work for," Teasdel recalls. "He asked me what I'd like to see. I told him I wanted the balance sheet and the profit and loss statement of the corporation. Anyone else would have thrown me bodily out of the office. Instead, Tuttle reached into his desk and tossed out the most complicated document I'd ever seen in my life.

"He asked me if I understood it. I had to admit that I could not. He laughed and said, 'I didn't think you would.' "

Shortly after reporting for work as a clerk in the comptroller's office, Teasdel was assigned to problems of determining why the navy had not paid a $3 million claim for wartime purchases of fuel and lubricants.

The answer was simple. The naval supply department was so undermanned it had not been able to get out from under routine paper work.

Teasdel went back to his office, gathered up a crew, and returned to the base to give the supply officer a hand in processing the claim. The claim was promptly paid.

Teasdel was then transferred to the Marine department as assistant to the accounting division manager, whom he subsequently succeeded. Advancing steadily, he was appointed successively manager of the accounting division of Standard Gasoline Company, another subsidiary, and, in 1941, director and secretary-treasurer of The California Company and three other affiliated pipe line and producing companies. He was elected vice president in 1944, administrative assistant to the president in 1946, and president in 1947.

Teasdel takes an active part in civic and industry affairs in New Orleans. He is a member of API, the Chamber of Commerce of the New Orleans area, International House, Propeller Club of the United States, New Orleans Petroleum Club, and New Orleans Country Club. He is also a member of the Board of Directors of the Mid-Continent Oil and Gas Association and the Hibernia National Bank in New Orleans.

Employes Meet the Boss

Continued from Page 90

quarters occupied by the Industrial Relations Department. An improved continuity of subject matter has been effected. Program time in some sections has been shortened and has been extended in others, and plant and field visitations have been streamlined to make presentation more effective.

As evidence of the scope of this training program and the value attached to it by department heads, this second group included employes from such distant points as Bismarck, N. D. Travel and other expenses of out-of-town employes for the duration of the conferences were paid by the company.

Lion Oil Company recognizes that the orientation program is only one facet of a well-rounded training program. Planning has been in progress for some months looking toward a long-term supervisory development program that is separate and apart from the orientation courses.

As a matter of fact, the first step in putting these plans into execution was taken on May 4, when selected front-line supervisors of the Production and Exploration Division were brought to headquarters in El Dorado for specific training. For one week they participated in intensive discussion on such subjects as supervisory duties and responsibilities, leadership, work planning, induction of new employes, cost control, and related operational and human relations matters.

As has been true with the orientation program, these conferences were planned and conducted by top management. The series was opened by J. E. Howell, vice president in charge of the Production and Exploration Division. The president of the company conducted the final conference. The other sessions were lead by key personnel responsible for the various phases of the division's activities.

This series of training conferences reached the same high degree of success reached in the orientation program. It is believed that the important factor in both instances was the active participation by top level management.—**The End.**

ACKNOWLEDGMENT

Prepared for WORLD OIL from a paper presented at a regional meeting of the Western Petroleum Refiners Association at Wichita, Kansas.

Read Faster

Continued from Page 87

for impairments of sight or hearing. From the beginning, Dr. Pellettieri urged class members to read for *meaning* or *content*, rather than for the purpose of gaining speed, and emphasized the fact that increased reading speed was a natural result of the course, not one to be sought at the expense of comprehension.

In following lab sessions, activities included the viewing of films and film strips. These were presented at slow beginning speeds, with only a few words at a time flashed on the screen. Gradually the speed was increased and longer phrases or whole lines were shown. Flash meters were used for training in perception span. Their function is somewhat similar to that of the reading films. Training was begun by first flashing cards containing only one or two words or symbols for the reader's recognition, then more, and finally entire lines. The pacers, used for accelerating reading speed, also help to reduce regression and increase attention span. This machine, operating at adjusted speeds, is equipped with a screen which moves down over the reading material, uncovering one line at a time. There was also "free reading" of technical and popular material, and "reading for detail" of standard prepared tests.

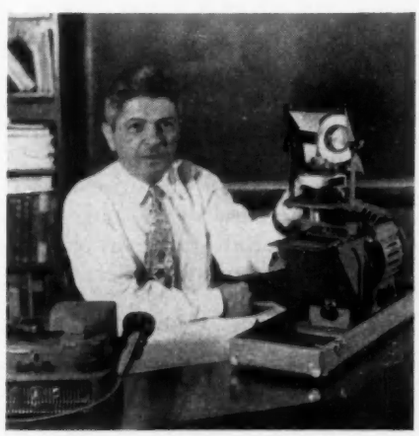
Each of these activities was scored for comprehension, accuracy and speed. Class members kept their own scores and competed against previous records rather than against each other.

Individual Problems Solved—Theory sessions brought to light individual reading problems. One class member whose speed and comprehension scores had leveled off, said after taking a test, "I just don't seem to get the hang of this." Dr. Pellettieri suggested that he translate the words into units of thought, which he did, and again his scores were moving upward.

Another reader complained, "I read through a page or two, and then have no idea of what I have been reading." In such instances the instructor watches for physical distractions—"looking away," poor posture, unusual bodily movement—of which the reader may not be aware, and calls them to the attention of the reader.

The fastest reader of the first session covered 433 words per minute and the slowest 177. For the group as a whole, the beginning average was 264 wpm. At the end of the course the fastest reader was going at a 926-wpm clip, and the slowest at a good 400. The group average had gone up to 568. See Table 1.

Dr. Pellettieri is frequently asked if such spectacular gains are not easily lost. He recently retested a similar group and found that after seven months time had elapsed, they still scored 85-90 percent on reading comprehension, speeds originally at 225-250 wpm were still at 500 wpm or more, and retention was high. The greatest gain these men felt they had made and kept was in their continuing awareness of reading ability—a conscious effort to read with greater skill.



HEAD MAN. Dr. A. J. Pellettieri is director of the University of Houston Reading Clinic.

TABLE 1
Here's How Group's Reading Skill Improved

IDENTIFICATION	Speed W.P.M.		Comprehension Percent		Reading Efficiency	
	Before	After	Before	After	Before	After
A	177	516	70	85	124	439
B	277	401	70	100	194	401
C	292	482	60	70	175	337
D	277	433	75	85	208	368
E	240	645	75	75	180	484
F	252	433	70	75	176	325
G	433	926	65	75	281	695
H	197	442	85	90	167	398
I	230	570	65	80	150	456
J	264	835	80	75	211	626
Total	2639	5683	715	810	1866	4529
Average	263.9	568.3	71.5	81.0	186.6	452.9
Gain	....	204.4	....	9.5	....	266.3

Industry Spokesmen Put FPC Gas Ruling Squarely Before Public

Oil Progress Week, October 10-16, afforded the oil and gas industry one of its best opportunities to explain to the general public its side of the continuing, serious wrangles over federal controls on natural gas—a topic which long has ranked high on the industry's major public relations program.

And industry leaders took advantage of an audience made receptive through an extensive nationwide program proclaiming the week as one devoted to general consideration of the industry. One principal aim of the speakers was to fully apprise the public of its own stake in the great debate over federal control of the wellhead pricing of natural gas—similar to the stake that same public has in the tidelands and in depletion allowance.

The Texas Mid-Continent Oil & Gas Association's recent annual meeting at San Antonio offered another chance for the industry to lay its cards on the table. In quick succession, too, industry spokesmen leveled warnings against federal encroachment in the natural gas field.

George T. Naff, president of Texas Eastern Transmission Corporation, said:

"The maintenance of this (abundant) supply requires additional reserves as the population . . . increases. Thus continuing the supply at a static rate is not sufficient. There must be incentives for additional development and for thorough exploration."

J. C. Donnell II, president of The Ohio Oil Company, warned that the recent Supreme Court decision compelling the Federal Power Commission to regulate field sales of natural gas entering interstate commerce will bring FPC into conflict with state conservation agencies "with producers caught in the middle."

Henry W. Bass, Dallas, president of the association, said that "whether our business retains its freedom or is gradually absorbed into a socialistic state" depends on the outcome of the controversy caused by the Phillips case decision which places federal control over prices paid independent gas producers.

K. S. Adams, chairman, Phillips Petroleum Company, produced pointed considerations of federal gas control in a recent address before the American Gas Association.

In his words, "Those who championed the cause of regulation (of natural gas) are about to learn that they may have won a battle only to lose the war."

Wisconsin and Michigan, principal advocates of federal regulation, were warned time and time again, Adams says, that federal control of gas producers would be detrimental to gas consumers' interests. But they were unmoved.

So, Adams says, "it is ironical that those two states should be the first to feel the pinch of federal regulation which their officers so zealously sought."

The pinch? Two proposed 30-inch pipe lines from the Gulf Coast to Michigan and Wisconsin, designed to help meet a part of the anxious and waiting markets have been deferred.

But, Adams points out, the "pinch" spills over into other fields: huge amounts of steel and other equipment will not be used for thousands of miles of pipe lines; pumping stations and other facilities will not be built; lost will be related construction jobs requiring much material and many hundreds of workers; gas distributors will lose future gas supplies; gas appliance manufacturers and dealers will lose untold numbers of kitchen ranges, heaters, furnaces, water heaters, clothes driers, and other gas-burning equipment; commercial and industrial enterprises will have less gas, older industrial areas will undergo an economic decline as manufacturing industries move to gas-producing states.

Oklahoma Order May Hurt Wildcat Drilling

Approval of a new producing formula for wells in newly-discovered pools, recently adopted by the Oklahoma Corporation Commission, threatens to curtail shallow wildcat drilling. Formerly, operators were given a blanket allowance of 150-barrel allowable for 60 days regardless of depth of well or other factors.

The Commission has approved an order which sets up a new formula whereby the allowable increases with well depth. The Commission also can raise or lower another variable factor in the formula to drop allowables when there is an abundance of oil, or increase them when oil is scarce.

The new formula works like this:

If the Commission decides on a market demand factor of 100 percent, a well 4000 feet deep in a discovery pool would be given an allowable of 38 barrels a day. However, a well 15,000 feet deep would get an allowable of 475 barrels. A well would have to be at least 10,000 feet deep to get the old 150-barrel allowable.

Massena Murray, director of conservation for Oklahoma, said the new ruling probably will curtail shallow drilling immediately. On the other hand, the official pointed out it would provide a better market factor percentage figure.

Because of the current oil surplus the Commission decreed a market demand factor of 80 percent.

The new formula is based on depth cost and considers other factors such as viscosity, temperatures, greater sand bodies, better productivity index, and larger spacing.

... at 2:00 in the morning!

P.E.S.A.*

* Petroleum Equipment Suppliers Association

Composed of: ***manufacturers*** **whose plants make the finest precision equipment...** ***supply stores*** **who add two other ingredients of value — where you want it — when you want it...** ***service companies*** **who make available to their customers the practical results of the theoretical research of some of the most brilliant scientific and technical men in the world.**

By **RAY L. DUDLEY,** Publisher, and **WARREN L. BAKER,** Editor

Refinery Yields Are Key to Situation

SURPLUS GASOLINE STOCKS continue to darken the United States petroleum industry's otherwise satisfactory economic position. However, the industry can solve this problem if it will properly regulate crude production and refinery operations during the next six months. On the other hand, the situation can become acute by next spring unless the industry exercises extreme caution.

Relative low distillate fuel oil inventories at the start of the heating oil season indicate a need for higher crude production and refinery runs to meet anticipated winter requirements for this product. But this would result in excessive additions to already heavy gasoline inventories. Any action that causes higher than normal winter growth in gasoline stocks will create serious economic hardships next spring.

Consequently, the industry must solve the problem by holding crude production and refinery operations near present rates. The additional distillate output which will be needed can be obtained by adjusting refining yields of this product upward. This would have a double benefit, since yields of motor fuel would be reduced automatically by higher distillate yields.

•

THE REAL PROBLEM is to hold additions to motor fuel stocks to absolute minimum volumes during the low consuming winter period, while making enough distillate fuel oil to meet heating oil requirements.

Reduced refinery runs during the past four months have improved the situation. Gasoline stocks in mid-October were 10⅓ million barrels higher than a year ago, although they had been 22 million barrels larger in mid-June. However, stocks were too big last year also.

Approximately 40 million barrels of motor fuel can be expected to be added to storage between November 1 and April 1. This volume added to the mid-October level of 150 million barrels would boost inventories to dangerously high levels by next spring. Any larger additions would create a serious enough situation as to jeopardize the industry's markets.

CHIEF SORE SPOT is the Indiana-Illinois-Kentucky area. If conditions in this territory can be corrected, the national outlook will be greatly improved as the oversupply of gasoline is largely limited to this area.

Indiana-Illinois-Kentucky gasoline inventories account for more than half of the gain in U. S. stocks during the past year. Stocks in this region are 6 million barrels larger than at the corresponding time in 1953, while U. S. inventories are up only 10⅓ million barrels.

No other section has experienced a substantial growth over 1953 volumes. Gasoline stocks in the Appalachian region are slightly over 1¾ million barrels larger; East Coast is up 1¼ million barrels; North Louisiana-Arkansas and the Gulf Coast are each a little over 1 million barrels higher. The Rocky Mountain sector is up ¾ million barrels.

On the other hand, California's gasoline stocks are down more than 1¾ million barrels; Oklahoma-Kansas is off 1 million barrels, and a small decrease has occurred in Inland Texas.

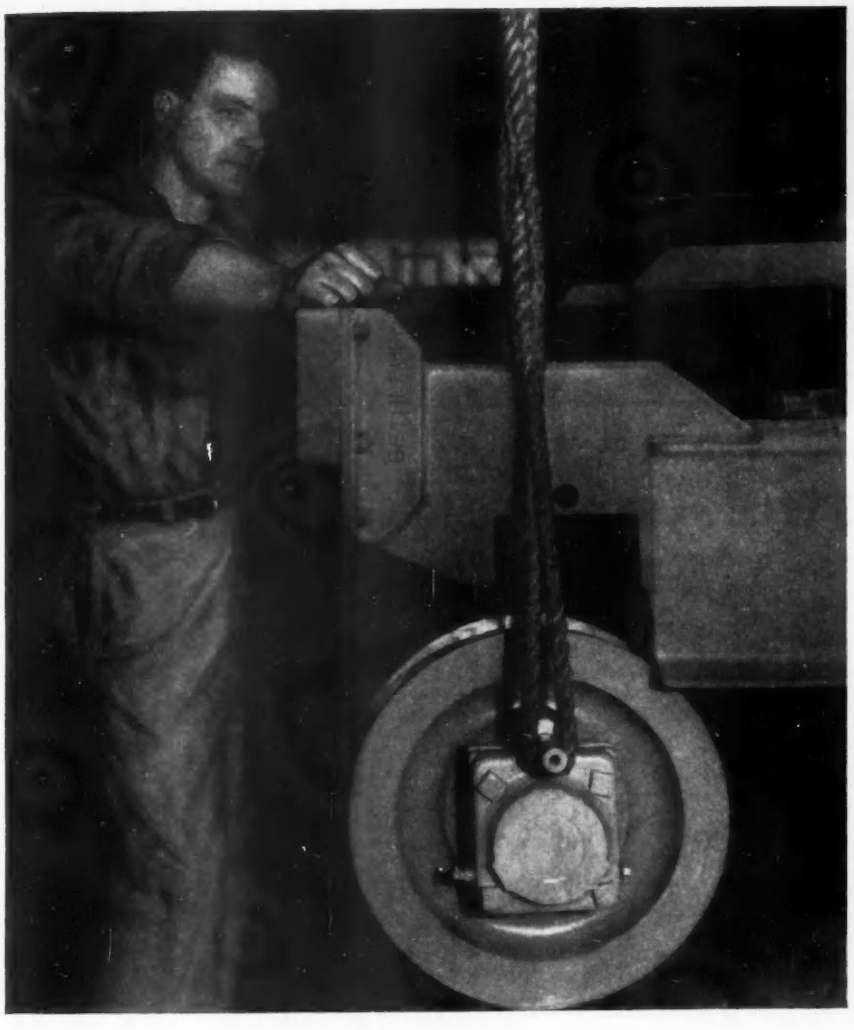
•

THE ONLY WORRY is gasoline inventories, other stocks being at satisfactory levels. With winter approaching, distillate stocks may be somewhat low. Until recently less distillate fuel oil was in storage than in 1953, but by mid-October stocks were 2½ million barrels higher than a year ago. This is not much of an increase in view of the anticipated gain in consumption. However, stocks in the heavier consuming areas are larger than this figure would indicate. Inventories in the Gulf Coast, California and Rocky Mountain are 3½ million barrels below 1953 volumes. While stocks in the remainder of the country are 6 million barrels larger than last year. Most of the increase is in regions where much heating oil is used.

The relative low level of distillate inventories gives refiners a chance to adjust yields to produce more heating oils without too much danger of creating surplus volumes, and this will provide enough heating fuel to meet requirements.

Meanwhile, crude oil stocks also are in good condition. They totaled 273 million barrels in early October, compared with 285 million barrels at the end of June. This is a satisfactory volume.

The Blanks with Extra Strength... yet not a pound of surplus weight



▲ Easy to machine, forged-and-rolled blanks are ideal for the making of sheave wheels.

◀ Crane-track wheels are made from Bethlehem forged-and-rolled blanks by Shepard Niles Crane & Hoist Corporation, Montour Falls, N. Y. The customer cites the longer life of these wheels, and their strength and shock-resistance — qualities valuable in the heavy-duty machines built by the company.

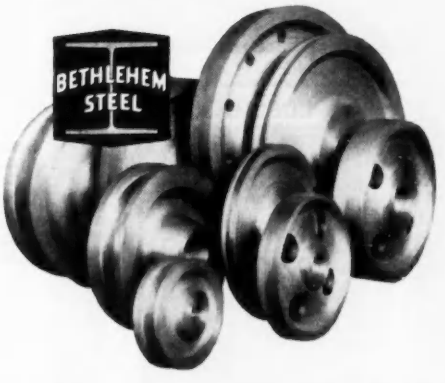
▲ Another common end use: gears.

On this page are shown several uses of Bethlehem forged-and-rolled circular blanks. All these applications require high strength. Yet in each case it is desirable to eliminate needless weight. That's why Bethlehem blanks are the logical choice, for they *do* have high strength without so much as a pound of surplus weight.

Reason: the blanks are made by a process that combines the steps of forging and rolling in a single operation, thereby assuring the density of forged metal and the good grain flow and structure of a rolled product. Result: unusual stress-resistance. Because of this characteristic, customers have frequently found it possible to use thinner sections than they formerly specified.

End products made from these blanks include spur, bevel, and herringbone gears, crane-track wheels, sheave wheels, clutch drums, flywheels, turbine rotors, tire molds, and similar parts. The blanks are available in a wide choice of sections, and they can be furnished untreated or heat-treated, as you prefer. Sizes range from 10 to 42 in. OD.

Why not investigate? It could be the first step toward a stronger product . . . and important shop economies we'll be glad to tell you about.



BETHLEHEM
Forged-and-Rolled
CIRCULAR FORGINGS

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation
Export Distributor: Bethlehem Steel Export Corporation

WORLD OIL'S VIEWS OF THE NEWS

- Gatchell reaffirms FPC stand . . . Proposed depreciation rules issued . . .
- Need for storage reemphasized . . . Union meeting, merger both doubtful . . .
- "Island" well brought in . . . NLRB issues stock plan warning to industry.

FPC Stands Pat

The Federal Power Commission is standing firm on its warning that no independent gas producer can legally invoke an "escape clause" and shut off service to an interstate pipe line.

Commission General Counsel Willard W. Gatchell reaffirmed this position to WORLD OIL after the Supreme Court, on October 14, refused to reconsider its June 7 decision in the Phillips Petroleum Company case. The decree, which only Congress now can revoke, brought under FPC price regulation Phillips and 4000 other producers who sell to interstate pipe lines.

Gatchell's statement grew out of the action of 14 independent Texas producers who, in September, invoked 30-day escape clauses against the Texas Illinois Natural Gas Pipeline Company, Chicago. The clauses prescribe that contracts can be abrogated when the FPC issues new rules —as it did under the mandate in the Phillips case—regulating production, processing, transmission and sale of gas.

But Gatchell said "these are merely scraps of paper, as far as we are concerned." He added bluntly that escape clauses were outlawed not only by the Natural Gas Act but also by the Phillips decision. "In addition," he said, "all the lawyers I have talked to agree that they have no legal standing."

The Texas producers were directed to file answers by October 29 to two formal complaints by Texas Illinois in which it asked the commission to enjoin the producers from terminating service. After the answers are received, said FPC Chairman Jerome K. Kuykendall, "they will be set for hearing and consideration of the entire matter."

But Gatchell doesn't expect any reversal of the commission's stand. Nor does he look for the producers to actually cut off service. "No producer can abandon service or abrogate his contract without Commission approval," he said. "That's the law."

Asked if he regarded the producers' action as a "test case," he replied that "it probably is—and if it is, we're ready to go to court." He hoped, however, that this would not be necessary.

Meanwhile, the commission and gas circles in the nation's capital appeared reconciled to the finality of the Supreme Court decision in the Phillips case. A commission spokesman said the FPC would push ahead with its controversial price-regulation rules until such time as Congress sees fit to change the law.

A spokesman for the Independent Natural Gas Association of America said: "It's now up to Congress. Everything has been pointing that way. The pipe line industry is not disappointed because it anticipated just what the court did, and has been building toward a remedial campaign in Congress."

Another issue of moment to the gas industry comes before the FPC on November 4. On that date, it will open hearings on price-escalator and so-called "Favored Nation" contracts which are now entangled in complexities of the Phillips edict.

. . . In Final Settlement

The federal government has relinquished its final claim to California's tidelands, and has given the state the net proceeds—$22,041,994—from royalties received by the federal government from offshore California oil developments.

Depreciation Rules Issued

Proposed rules putting into effect the liberalization of depreciation for tax purposes approved by Congress in its overhaul of tax laws have been issued by the Internal Revenue Service.

The new changes will permit the use of the declining balance method of depreciation, or any other similar method which will achieve the same purpose, enabling taxpayers to depreciate about two-thirds of property or equipment cost during the first half of its estimated life. Previously, depreciation has been divided equally over the estimated life of property or equipment.

Storage Need Emphasized

The 1954 report of the Committee on Petroleum Storage Capacity re-established the industry's inherent need for large storage capacity in relation to the amount of crude oil and products moving into and out of such storage in order to conveniently and economically supply the current and forward requirements of customers.

This report, presented at the October meeting of the National Petroleum Council, Washington, D. C., by L. S. Wescoat, committee chairman, indicates that 100 barrels of storage is required for every 47 barrels of inventories contained therein, if the industry is to enjoy complete flexibility at all times in normal operations. The 1952 ratio was 100 barrels of storage to 45 barrels of inventories.

Total storage capacity reported for crude oil, clean products and residual fuel was 991 million barrels, more than half of which was assigned to clean products —gasoline, kerosine and distillate fuel oils.

Another point confirmed by this survey, as in others, said Wescoat, is the large portion of total reported inventories that are unavailable for shipment, i.e., those wrapped up in the industry's far-flung manufacturing, storage and transportation systems, that must be kept intact if the industry is to function. On March 31 these unavailables totaled almost 273 million barrels, or 50.7 percent of the 538 million barrels that were reported as in crude oil, clean product and residual inventories.

Included in the survey for the first time was a study of the underground storage capacity of the industry. Only figures reported were in connection with LPG or LRG, and the total for the U. S. was about 5½ million barrels as of March 31, almost half of which was found to be in Texas inland area.

PENETRATION'S ONLY PART OF IT!

KONE-SHOT®

shaped-charge perforating

GETS THE RESULTS YOU'RE AFTER

That's because KONESHOT—Lane-Wells special shaped-charge perforating—gives you the *accuracy* of Lane-Wells famous depth-measurement system to deliver the penetration you want deep into the exact place you've ordered it put. That's what makes KONE-SHOT the unbeatable combination—penetration plus accuracy!

LANE ⊙ WELLS COMPANY®

TECHNICAL OIL FIELD SERVICES

Write for further information on LANE-WELLS KONESHOT

Tomorrow's Tools—Today!®

KZ-84-A

General Offices, Export Office and Plant • 5610 So. Soto St. • Los Angeles 58, California

Los Angeles • Houston • Oklahoma City • Lane-Wells Canadian Co. in Canada • Petro-Tech Service Co. in Venezuela

AAODC Elects Officers for 1955

Elected American Association of Oilwell Drilling Contractors officers for 1955 at the October meeting of the association held in Los Angeles, Calif., were, seated left to right, W. S. Fitzpatrick, Fitzpatrick Drilling Company, Corpus Christi, Texas, vice president, Gulf Coast; H. W. Davidson, Davidson Drilling Company, Midland, Texas, vice president, West Texas and New Mexico; Brad Mills, Dallas, executive vice president; J. V. Dunbar, Dunbar Drilling Company, Denver, president; C. F. Whaley, Chet Whaley Well Servicing Company, Houston, national vice president; R. L. Manning, R. L. Manning Company, Denver, vice president, Rock Mountains.

Standing left to right: R. L. Rose, Drilling and Exploration Company, Los Angeles, Calif., vice president, California; W. L. McClusky, M. J. Delaney Company, Dallas, secretary; J. K. Butler, Oil Production Maintenance, Inc., Houston, vice president, well servicing; John J. Moran, Moran Bros., Wichita Falls, Texas, vice president, North and Central Texas; M. S. Church, Dallas, general counsel.

Not in the picture are Herbert A. Woolf, Woolf and Magee, Tyler, Texas, vice president, Cretaceous and Tertiary Basins; Gail C. Culter, Culter Drilling Company, Tulsa, vice president, cable tools; Dee A. Sikes, Helmerich and Payne, Inc., Tulsa, vice president, Central Mid-Continent; Alva C. Davis, Fairfield, Ill., vice president, Illinois, Michigan, Indiana, and Kentucky; and L. A. Beecherl, McDaniel and Beecherl Drilling Company, Dallas, treasurer.

Union Convention, Coalition in Doubt

What has happened to O. A. (Jack) Knight's much-ballyhooed, in-the-bag merger of his CIO Oil Workers with Elwood Swisher's CIO Chemical Workers?

Things seemed all set when, suddenly, the bottom dropped out of plans for a joint merger convention at Cleveland November 15-17. Also, Knight's vision of a million-man coalition of oil and chemical workers has become a mirage and may fade into oblivion.

While Knight and Swisher both insist the merger will go through—even though belatedly—all is not rosy and it could be that President Dave McDonald of the powerful CIO United Steel Workers, is the difference.

McDonald, whose distaste for CIO President Walter Reuther is no secret, is supposed to have offered Swisher a cool million dollars to align his United Gas, Coke & Chemical Workers with the USW. This would serve three purposes: arm Swisher with enough money for a big organization drive and make him independent of Reuther's bounty; cut the ground from under the OWIU-UGCCW merger; and "take a fall" out of Reuther who has been pushing the merger as the nucleus of a future CIO union that would dominate the oil, chemical, and related fields.

It is well known that McDonald would like to see Reuther replaced as head of the CIO. McDonald denied, at the recent USW convention in Atlantic City, that he was "out to get" Reuther. But talk has that as his objective, and his reported offer to Swisher could be a devious way of going about it. In other words, a sort of divide-and-conquer strategy.

Swisher's executive board met in Washington October 11-12. It was supposed to put its final OK on the new OWIU-UGCCW constitution ratified at the September convention in St. Louis. Vigorous and vociferous opposition developed instead.

Upshot of this was that the board decided to delay the joint convention with the oil workers until some time in March. This knocked Knight's plans into a cocked hat and he, too, ordered his ratification convention postponed until March.

In the interim, Knight has called a November 4 meeting of his strategy board to map plans for a 5 percent wage drive. The meeting will be held in Denver, OWIU headquarters. It is presumed, however, that the main topic will be the faltering merger.

The UGCCW St. Louis convention ratified the combine only after Reuther warned bluntly that, unless it went through, he would deprive Swisher of much-needed organization money.

A UGCCW spokesman in Washington, when asked if the consolidation was in danger because of McDonald's reported offer, said he didn't know. But he also suggested that World Oil ask McDonald whether he was going to back up his million-dollar proposal with "deeds instead of words."

Thus it would seem, at least on the surface, that McDonald has tossed a big wrench into the merger machinery. Time will tell. Meanwhile, the AFL and independent unions Knight had depended upon as future members of his big coalition, have pulled into the shadows. Knight's only explanation was that he won't put real steam behind this campaign until the OWIU-UGCCW combine is in the bag.

Oil To Hold Its Own

Potential effects of atomic energy upon petroleum industry demands should be quite negligible within the next decade or two, in the opinion of Austin Cadle, manager, Economics department, Standard Oil Company of California.

Cadle pointed out recently that when this new source of energy is developed for commercial uses on an economic competitive basis, the almost unanimous present opinion of authorities is that it will act in a supplementary role to the use of fossil fuels. Liquid or solid fossil fuels probably could not fully meet requirements of expanding energy requirements, it is thought, so atomic (and possibly solar and other forms of energy) ultimately will be needed in large volumes.

Finding the amounts of petroleum which will be called for, according to Cadle, constitutes a physical and financial problem of proportions far greater than we have ever faced in the past. There is every indication, he said, that there is a "fascinating brillant future" for petroleum.

Jersey Estimates Reserves

For the first time, Standard Oil Company (New Jersey) has disclosed its gross reserves of crude and condensate. And the figures filed in a preliminary prospectus to the Securities and Exchange Commission is 11¼ billion barrels, about 33 percent of total U. S. reserves.

This reserve figure represents total reserves of more than 50 percent Jersey-owned affiliates. Including other companies in which Jersey Standard is a stockholder, total worldwide gross reserves amount to slightly more than 22½ billion barrels.

While the company does not maintain complete estimates of gas reserves found as a result of exploration and production activities and owned by its subsidiaries, it estimated that net gas reserves within the U. S. now owned by subsidiaries total more than 16 trillion cubic feet. The estimates were given as of December 31, 1953.

Optimism—and Why

The world may enjoy the greatest economic development in history during the next ten years.

This optimistic view was offered recently by B. Brewster Jennings, president of Socony-Vacuum Oil Company, Inc., in an address before The Los Angeles World Affairs Council.

Of acute interest to the oil industry at large are the reasons which this expert gives for his optimism. Speaking on some aspects of the overseas operations of American oil companies, whose capital investments are estimated at more than $4 billion, Jennings, said the subject bears importantly, in several ways, on the well-being of all, "as neither our standard of living nor our national security can be supported without an abundance of oil for ourselves and for those nations that stand with us."

Supporting his views, Jennings said, although Russia and the West still are at odds, "there is some evidence, that for the next several years anyway, Russia will not be disposed to go all out to accomplish its objectives," adding that meanwhile "each side will do everything in its power to improve and strengthen the economy of its orbit."

Reasons for an optimistic outlook, said Jennings, are:

- The successful conclusion of the recent Iranian oil negotiations, which will help revive Iran's economy, make it a strong friend of the West and preserve to the free world a great supply of crude.
- Continued growth in the free world economy generally.
- Plenty of oil is in sight in the sense of proven reserves and ability to produce.

•

Drilling vs. Economics

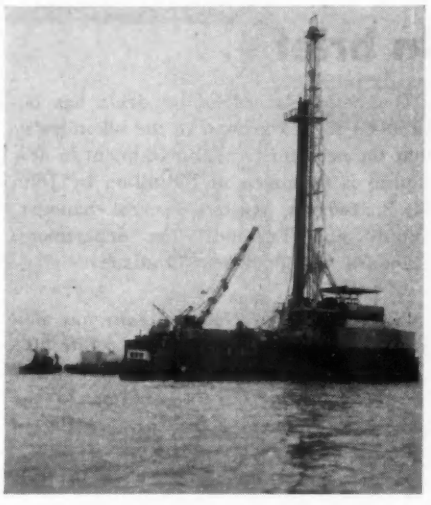
Will the reduction in the drilling rate continue over the next few months?

This question was posed recently by B. Brewster Jennings, president, Socony-Vacuum Oil Company, Inc., after he pointed to the downward trend in the past three or four months in permits issued for new well locations and in the number of drilling rigs in service.

"Just now the industry is admittedly drilling more wells than necessary," he said, "to replace current production and to maintain the historical relation of reserves to production."

But he said that "whatever happens will be the result of many judgments impinging independently on the crude oil market price and on the broad conduct of the crude oil producing segment of the industry."

Thus economic laws are functioning through the independent actions of many individual operators.



A 50-BY-75-FOOT pile-supported wharf adjoins the 75-foot diameter rock-filled circular island from which Monterey Oil Company's Monterey-Texas State 4 was completed in October for a flowing production of 300 barrels a day of 26.4 gravity clean oil through 30/64 bean from the 5906-6280-foot interval. Several wells can be directionally drilled from this island location about 1½ miles off Seal Beach, Calif.

Offshore Well Brought In

Interest in the productive possibilities of California's offshore submerged lands has been given a distinct boost with the announcement by Monterey Oil Company that it had successfully completed its first offshore island project, Monterey-Texas State 3, as a flowing well.

The first producing well to be completed in a strictly offshore island operation in California waters, the project is situated in 45 feet of water at a point some 8000 feet off Seal Beach and about 4½ miles southeastward from the Wilmington oil field.

Marking the discovery of a new field, the well flowed, during a three-day test period, at rates averaging 300 barrels per day of 26.4 gravity clean oil through a 30/64 flow bean, with a pressure of 100 pounds per square inch on the tubing and 750 psi on the casing. Production was from a 374-foot interval between the shoe of the seven-inch, cemented at 5906 feet, and plugged-back depth of 6280 feet. No information was released by the company as to the identity of the producing horizon, but it is presumed it is comparable to one of the several producing formations identified in the Wilmington field. The well was shut in pending installation of facilities for receiving and transporting production.

Representing an expenditure of about $1 million, including the island and adjacent wharf facilities, the well was carried originally to a depth of 10,162 feet but was plugged back to the present producing interval. The well was spudded in on May 22. The project is owned 50 percent by Monterey Oil Company, the operator, and 50 percent by The Texas Company.

The 75-foot diameter island was designed originally to accommodate three wells; the first to be drilled vertically and subsequent wells to be slant-drilled. Situated in 45 feet of water and with deck about 30 feet above the water line, the circular structure is constructed of steel piling and filled with rock and sand, the latter covered with a heavy concrete decking. A 50- by 75-foot pile wharf is situated on the land side of the island. Brown Drilling Company, Long Beach, Calif., contractor on the project, is using a 136-foot mast rig equipped with four 205-horsepower diesel engines. Because of the restricted area, the sub-structure, instead of having eight feet of clearance, was modified to leave 14 feet in order to accommodate engines, mud pump and mud tanks beneath the rig floor.

Before moving out to the island earlier this year, the contractor drilled a conventional well in the Signal Hill area with the rig, drawing out in the yard the exact dimensions of the island and wharf, to make sure re-arranged equipment would operate as designed on the restricted floor area of the offshore location.

An eight-foot concrete splash wall 16 inches thick surrounds the rear two-thirds of the circular island. Fuel, drilling mud in liquid form, fresh water and supplies are barged to the island from Long Beach. Waste water and mud are barged back to the mainland for disposal. A water taxi service transports crews and other personnel to and from the Seal Beach pier.

The company on October 5 was spudding in a second well from the island, but no announcement was made as to which direction it would be drilled nor the proposed depth.

Lease Awards Scheduled

The Department of Interior hopes to make formal awards by November 1 on the $130 million of bids for leases on submerged oil, gas and sulphur lands on the Continental Shelf off Louisiana's coast.

Meanwhile, Secretary Douglas McKay is hopeful that federal-state dispute over the boundary line of Louisiana's tidelands can be ironed out by a joint committee of government-state officials appointed last month.

The dispute concerns lands which Louisiana claims but which the Supreme Court, and later the 1953 Submerged Lands Law, vested in the federal government. A major clash was averted when the committee was created. Both the government and Louisiana had advertised some of the same parcels for lease.

One thing is certain: unless the matter is settled amicably, either Congress or the courts will have to reach the final solution. Attorney General Herbert Brownell, Jr., said his aides are studying "the whole tidelands question." He said lawsuits are possible, but he hopes to avoid them.

Louisiana claims her domain extends at least 10½ miles into the gulf in some areas, and 27½ miles in others. Texas claims 10½ miles.

Work Starts on Fuels Report

President Eisenhower's Cabinet Committee on Fuels Resources is ready to plunge into the task of writing its report and recommendations on future administration policies toward oil, coal and natural gas.

The report must be ready by December 1 so the President can use it in drafting legislative proposals to the new Congress.

The blue-ribbon committee held long hearings—most of them featured by bitter rivalry for the energy market—and set October 20 as the final date for submission of briefs. After it digests these and previous testimony, it will begin work on its report.

Eisenhower appointed the committee last July 30, with the stated objective of computing fuels resources in relation to war emergency needs and "orderly industrial growth." But his primary purpose was to find a way to keep each industry a healthy part of the economy, without one destroying or seriously damaging the other.

Never, perhaps, has such a high-level group been so belabored by rival interests in the hope that their conflicting views will prevail in the committee's report.

At times the three industries were virtually tearing at each other's throats and each made clear that the battleground will shift to the new Congress in January if the committee's recommendations are unpalatable.

Congress will be the final arbiter but it, too, is certain to split wide open when oil and coal state lawmakers square off against each other.

The cabinet committee is headed by Mobilization Director Arthur S. Flemming. Members are the secretaries of state, defense, interior, commerce, and labor and Attorney General Herbert Brownell, Jr., Eisenhower created it after oil and gas circles angrily protested establishment of an inter-departmental committee to look into the ills of coal.

They pointed out that oil and gas also have their problems even though both have cut deeply into the coal market. Independent oil producers, hard hit by imports of cheap foreign oil and increasing competition from gas, urged the committee to propose a firm ban on excessive imports.

The gas people cited the "destructive potentialities" of the Supreme Court decision in the Phillips Petroleum Company case which saddled the Federal Power Commission with price-policing of all gas sold in interstate commerce. Unless there is corrective legislation, they said, gas supplies could "dry up" for want of profit incentive.

Flemming invited state control bodies, along with the oil, gas and coal industries to submit their views by October 20. He said "they will be extremely helpful to the committee in developing its recommendations."

In brief . . .

Competition's unflagging drive has occasioned such a growth in the oil industry that the need for annual investment in new capital is estimated at $5 billion by John W. Boatwright, assistant general manager, Supply and Transportation department, Standard Oil Company (Indiana).

El Paso Natural Gas Company has filed with Federal Power Commission a rate hike application amounting to $18 million, or 15 percent, which is in addition to the $15.2 million increase now being collected by the company but subject to refund.

Magnolia Petroleum Company has spudded in its first wildcat in Texas' offshore waters. The well is ten miles southwest of Sabine and eight miles off the coast of Jefferson County, and is being drilled under a permit for a 13,000-foot test to be drilled from a platform in 36-foot deep water.

Sun Oil Company and Atlantic Refining Company are joint winners of the 1954 silver Founder's Medal, an award by the Drexel Institute of Technology in recognition of the companies' "contribution to the industrial vitality of the eastern seaboard and to the strength of the national economy."

Montana Power Company has filed with Federal Power Commission a request for a permit to import natural gas from Canada for general use in Montana.

Societe Nord-Africaine des Petroles, owned 65 percent by Gulf Oil Corporation, has called off all Tunisian oil exploration. Drilling operations failed to give any indications of oil or gas in the areas in which SNAP has conducted exploratory efforts since 1952.

Imminent is Office of Defense Mobilization's report to be made to the National Security Council on need for oil pipe line transportation to the East Coast during any emergency. Likely, the report will follow along lines of an earlier one by the Oil and Gas Division.

Oil reportedly has been discovered in Switzerland at about 6800 feet; however, the account of the discovery published in a Basel newspaper said it was too early to evaluate the extent of the deposit.

Texas Railroad Commission set the state's November daily crude allowable on a continuing 15-day basis at 2,864,749 barrels, up 64,300 barrels from October 16 permissive flow.

NLRB Rules on Stock Plan

The National Labor Relations Board has put all industry on notice that once a corporation sets up a stock purchase plan for its union employes and to which it contributes, the plan thereafter becomes a legal collective bargaining issue.

The far-reaching decision, rivaling only that in the Inland Steel Company case in 1948, was handed down by a 3 to 1 vote against the Richfield Oil Corporation, and in favor of O. A. (Jack) Knight's Oil Workers International Union (CIO).

In 1953, more than 30 corporations had such plans, covering millions of workers.

The board majority held that the Richfield plan "came within the meaning of wages and other conditions of employment." It said the Labor Relations Act requires an employer to bargain on these matters.

Richfield—supported by a brief filed by the Chamber of Commerce of the U. S.—argued that such bargaining constituted undue interference in management affairs by union control of employes' voting rights as stockholders.

The decision came in the face of recent charges by organized labor that the NLRB was "stacked" against the working man. Voting against Richfield were Chairman Guy Farmer and members Ivar H. Peterson and Philip Ray Rodgers. Member Abe Murdock did not take part and Member Albert C. Beeson dissented.

Defense Units Picked

Dr. Robert E. Wilson, chairman, National Petroleum Council Committee on Oil and Gas Emergency Defense Organization, has appointed two subcommittees on Continuity of Company Operations and Advance Preparations and Plans. The chairman of the board of Standard Oil Company (Indiana) appointed H. G. Mangelsdorf, Esso Standard Oil Company, as chairman of the subcommittee on continuity, and R. G. Arner, Sinclair Oil Corporation, as chairman of the subcommittee on advance planning.

The parent committee is investigating ways and means of meeting oil and gas industry crises which might result from an enemy attack as well as means of rehabilitating losses to assure the U. S. of adequate post-attack supplies of oil and gas.

Appeal for the Future

Westcoast Transmission Company may have to wait until next year to find out when the Circuit Court will hear its appeal from Federal Power Commission denial to grant the company rights to serve the Pacific Northwest with natural gas imported from Canada.

Mr. "M" was the picture of health

Mr. M. was in the best of health, and when we first suggested that he take certain steps in case of death he thought it was a lot of needless trouble. We showed him how our Trust Department could arrange his affairs in an orderly way, and allow his operation to continue after his death.

Following the advice of our Trust Department, he had his lawyer draw up a will for him. And, even though he thought it was a waste of time, he had his wife's will made, too. His finances were set up to run as smoothly and as efficiently as his oil operation. Every future possibility had been taken care of in the plans made by the Trust Department.

Now this story has a twist. Mr. M hasn't died yet. But he lives in Texas, and his wife died early in the year. Had she died without a will, and if her community property share of his operations had not been taken care of by such will, he would have had a sizable part of his estate tied up in court proceedings for many months. He would have missed out on an excellent deal which he was able to make. And now he knows that when he does die his children will benefit, through this orderly financial arrangement, from the energy and hard work he put into building his holdings.

The National Bank of Commerce is geared to help you with your problems. Impartial advice, based on our experience as oil men and money men will help you, too. Oil men **going up** come to the Oil Loan Department of The National Bank of Commerce.

E. O. BUCK, VICE PRESIDENT, OIL LOAN DEPARTMENT

THE NATIONAL BANK OF COMMERCE

OF HOUSTON

Gulf Building, Houston, Texas "The Bank for All the People"

MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION

Facilities of the Oil Loan Department of The National Bank of Commerce are available in Wyoming, Colorado, Nebraska, New Mexico, Texas, Louisiana, and Mississippi.

dubose

U. S. Wells Completed in September and First Nine Months, 1954.

STATE or DISTRICT	NEW WELLS COMPLETED AND FOOTAGE DRILLED															Rigs in Operation		
								TOTAL NEW WELLS			Total Footage Sept., 1954	DETAILS FOR JANUARY-SEPTEMBER						
												New Wells			Footage			
	Oil	Dist.	Gas	Dry	Water Input	Gas Input	Water Disposal	Sept., 1954	Aug., 1954	Sept., 1953		1954	1953	Percent Diff.	1954	1953	Sept. 30, 1954	Aug. 31, 1954	Sept. 30, 1953
Alabama				4				4	5	9	24,735	57	79	— 27.9	300,715	413,508	4	5	7
Arizona												8	6	+ 33.3	30,774	19,960	1	5	1
Arkansas	41		1	26				68	57	54	227,765	440	367	+ 19.9	1,552,133	1,320,850	31	40	53
California	140		3	52				195	203	188	846,243	1,849	1,914	— 3.4	8,396,097	8,273,800	203	197	259
Colorado	28		1	65				94	120	65	516,440	956	515	+ 85.6	5,268,676	2,637,799	60	70	60
Florida				2				2	5	5	8,259	26	28	— 7.2	159,014	180,362	3	3	3
Georgia										1		7	5	+ 40.0	18,008	13,756	1		3
Idaho													4			22,748			2
Illinois	167		1	124				292	320	189	681,982	2,308	1,463	+ 57.8	5,622,264	3,611,643	292	288	245
Indiana	14		1	45				60	75	120	92,504	606	981	— 38.2	924,171	1,663,291	124	117	162
Kansas	187		27	163			2	379	347	329	1,357,391	3,175	3,457	— 8.2	11,211,421	11,977,677	412	392	430
Kentucky	38		15	56	1			110	125	115	199,605	1,030	881	+ 16.9	1,928,985	1,742,313	93	78	95
Louisiana	215	16	18	107				356	358	256	2,035,329	2,688	1,883	+ 42.8	16,661,204	13,393,778	273	272	266
North Louisiana	145	2	11	52				210	196	116	631,366	1,423	805	+ 76.8	4,180,895	2,995,870	60	57	59
South Louisiana	70	14	7	55				146	162	140	1,403,963	1,265	1,078	+ 17.3	12,480,309	10,397,908	213	215	207
Maryland													4			15,614	5	4	1
Michigan	21			30				51	44	50	137,116	413	448	— 7.8	1,086,495	1,162,099	101	111	117
Mississippi	11	1		26				38	46	29	247,941	310	287	+ 8.0	2,172,936	1,993,326	47	45	43
Missouri									1	8		9	25	— 64.0	9,531	20,645	2	2	
Montana	14		2	20				36	29	64	135,216	259	326	— 20.6	1,014,199	1,425,135	36	38	57
Nebraska	36			16				52	57	33	298,701	325	255	+ 27.5	1,809,308	1,322,398	27	20	18
Nevada									2	1		10	8	+ 25.0	51,218	11,115	3	2	
New Mexico	55		39	25				119	85	142	569,639	899	1,103	— 18.5	4,740,705	6,259,005	115	119	178
New York	27				16			43	43	80	58,769	451	691	— 34.7	658,396	963,889	64	69	105
North Carolina													1			1,570			
North Dakota	20			7				27	27	25	202,872	210	189	+ 11.1	1,471,332	1,418,677	27	28	32
Ohio	27		19	27				73	79	75	139,231	774	721	+ 7.4	1,499,159	1,482,882	188	196	189
Oklahoma	322	2	29	197	3		1	554	564	605	1,863,423	5,994	5,389	+ 11.2	20,362,206	18,985,841	700	678	596
Pennsylvania	16		21	7	13	5		62	52	127	144,254	750	1,212	— 38.1	1,361,621	2,089,035	131	148	244
South Dakota									1	1		16	14	+ 14.3	90,641	70,258	2	2	3
Tennessee													1			2,269			
Texas	832	41	55	607	5		5	1,545	1,644	1,328	6,787,951	13,807	12,540	+ 10.1	62,207,947	57,525,595	1,239	1,227	1,327
Dist. 1: South Central	71		5	44				120	99	72	378,256	842	614	+ 37.1	2,804,148	1,982,968	33	31	28
Dist. 2: Middle Gulf	26	14	4	35				79	64	66	514,992	617	586	+ 5.3	3,734,922	3,618,643	30	35	38
Dist. 3: Upper Gulf	71	10	5	54			2	142	155	145	900,502	1,320	1,234	+ 7.0	8,890,899	8,339,112	123	116	138
Dist. 4: Lower Gulf-S.W.	33	14	3	52				102	112	134	570,870	1,089	1,380	— 21.1	5,701,395	7,938,689	60	72	100
Dist. 5: East Central	7		1	17				25	26	16	92,044	213	215	— 0.9	807,488	865,136	11	13	11
Dist. 6: Northeast	37	2	6	27				72	53	47	403,165	544	371	+ 46.6	3,195,496	2,225,928	52	60	51
Dist. 7-B: North Central	121		1	166	2		1	291	287	249	839,138	2,213	2,323	— 4.7	7,077,774	7,539,716	127	134	174
Dist. 7-C: West Central	69	1	5	43				118	122	81	623,955	992	1,011	— 1.9	5,141,783	4,960,059	140	120	130
Dist. 8: West	198			44	1			243	268	197	1,344,940	2,194	1,685	+ 30.2	13,041,026	9,718,988	343	338	344
Dist. 9: North	149		5	116	2		2	274	351	269	839,281	3,035	2,730	+ 11.2	9,324,184	9,121,354	240	236	227
Dist. 10: Panhandle	50		20	9				79	107	52	280,808	748	391	+ 91.8	2,488,832	1,215,002	80	72	88
Utah			1	10				11	6	3	40,168	47	58	— 19.0	218,214	324,809	29	23	21
Washington																	1	1	1
West Virginia	10		53	9				72	39	46	226,202	414	466	— 11.2	1,202,484	1,300,913	171	170	215
Wyoming	42	1	3	23				69	87	96	323,495	879	594	+ 48.0	4,632,865	2,968,724	82	89	146
Total United States	2,263	61	289	1,648	38	5	8	4,312	4,421	4,044	17,165,231	38,717	35,915	+ 7.8	156,662,719	144,615,284	4,467	4,439	4,879
Total Western Canada	76		17	57			1	151	259	202	6,117,530	1,538	1,646	— 6.6	6,117,530	6,778,004	121	109	184

Completions Continue High

Three-quarter total assumes a lead of almost 8 percent over last year.

THE HIGH RATE of activity that has characterized this year's drilling campaign since its beginning was continued through September and the resulting completed wells boosted the three-quarters total to a lead of almost 8 percent over last year's. Drilling in the final quarter should easily put the year well ahead of 1953 and establish a new all-time high mark of over 50,000 new wells. That would be the first time in the history of the U. S. industry that 50,000 wells were drilled in a single year.

September's wells totaled 4312 to top the 4044 completed in September of last year and to boost this year's total to 38,717. That amounted to a gain of 7.8 percent over last year's three-quarter total of 35,915 new wells.

Represented in September's wells were 17,165,231 feet, which was about one million feet more than were recorded in September, 1953. It also ran the year's over-all total to 156,662,719 feet, which was an increase of 9.2 percent over last year's 144,615,284 feet. At the current drilling rate, U. S. drillers should accomplish more than 200 million feet of hole this year, and that would be the first time that level was reached. It has been an active year for the industry's drillers.

Average depth of new wells so far this year has been 4046 feet, while a year ago each new well was taken to 4026 feet. This year's average was the second deepest ever recorded. The 1952 average of 4051 feet remains in top spot.

Most of the leading drilling states have contributed their shares to the nation's increased operations this year. Texas, the most active state, increased its completed wells 10 percent over last year's. The No. 2 area, Oklahoma, has seen wells increase better than 11 percent.

Of the top five states, Kansas was alone with a drilling decline. Louisiana and Illinois, Numbers 4 and 5, respectively, raised their operations substantially.

Central Nebraska Has Possibilities

• Oil and gas potentialities of entire sedimentary section can be tested with comparatively shallow, low-cost wells, generally under 4500 feet.

• Less than 100 adequate tests have been drilled in this region comprising some 25,000 square miles.

By PROF. E. C. REED, Director, Nebraska Geological Survey, Lincoln, Neb.

SUCCESSFUL OIL and gas development in the Denver-Julesburg Basin of Western Nebraska, during the past four years, has focused attention on other parts of the state where there is presently no production of significance. This has resulted in a reexamination of the Central Nebraska Basin by both large and small operators during the past few years and extensive leasing, especially in the western part of the Basin. To date comparatively little new exploratory drilling has been done, but increased activity is expected. It is the purpose of this article to discuss the general geologic considerations which may affect the possibilities of developing oil and gas in commercial quantities.

Definition of Basin. Great confusion usually exists when basin names are applied, especially in areas of complex geologic history, because the basin name is applied with different connotations. Being principally concerned with an area where dual or multiple prospective horizons are present, the Central Nebraska Basin will be limited to that portion of Nebraska east of the Cambridge-Chadron arch and west of the Table Rock arch (Nemaha granite ridge), where not only Permian and Pennsylvanian formations are present, but pre-Pennsylvanian sedimentary formations also occur in the subsurface (See Figure 1).

Although the Cambridge-Chadron arch trends northward and northwestward across Nebraska from about Range 26 west (southeastern Redwillow County) at the Kansas line to Range 47 west (northeastern Dawes County) at the South Dakota line, the east flank of this broad structural feature is partly represented by an area where Pennsylvanian sediments rest on the pre-Cambrian igneous or metamorphic rocks and no pre-Pennsylvanian sedimentary formations of Cambrian to Mississippian age occur between the Pennsylvanian and the pre-Cambrian rocks. East of a line through eastern Furnas, western Phelps, eastern Dawson, eastern Custer and western Garfield counties, the Cambrian to Mississippian sediments are present.

Farther to the north this line probably swings northeastward across Holt and eastward across Knox and Cedar counties paralleling the ancient Siouxana uplift, but there has been too little drilling in northeast Nebraska to place this boundary with great accuracy. The southeastern edge of the Central Nebraska Basin is a line northeastward across Pawnee and Johnson counties, and northward through central Otoe, Cass and Sarpy counties. The Central Nebraska Basin comprises more than 25,000 square miles.

It appears that the Central Nebraska Basin is a northward extension of the Salina Basin of Kansas and is not connected with the Williston Basin of western North Dakota so far as the extent of pre-Pennsylvanian sedimentaries is concerned. The distribution of Cambrian to Mississippian rocks indicates a connection between the Forest City Basin of southeastern Nebraska and the Central Nebraska Basin through southwestern Iowa and northwestern Missouri. Therefore the boundary between these two basins is somewhat arbitrarily placed at or near Omaha along the Iowa-Nebraska line.

Geologic History. The study of the records of wells drilled in the Central Nebraska Basin indicates a relatively complex geologic history as indicated by the distribution of pre-Pennsylvanian sedimentary formations (Figure 2). The principal events that may have had a bearing on oil and gas accumulation are summarized below.

1. Invasion of Upper Cambrian and Lower Ordovician seas from southeast encroaching upon Siouxana arch upland; Table Rock and Cambridge arches not present.

2. Table Rock and Cambridge arches broadly upfolded at close of Lower Ordovician (Arbuckle) time and Cambro-Ordovician sediments removed from crestal parts of Table Rock and Cambridge arches.

3. Invasion of Upper Ordovician and Silurian seas from the east overriding the Table Rock arch depositing progressively thinner sediments westward and northwestward.

4. Rejuvenation of Siouxana uplift at close of Silurian time resulting in northwestward truncation of Silurian rocks and overlap by Devonian sediments which thin markedly westward and northwestward as the Cambridge arch is approached.

5. Some uplift, folding and erosion at close of Devonian with invasion of Mississippian sea from east and southeast resulting in overlap of Mississippian sediments westward overriding southern part of Cambridge arch.

6. Extensive folding at close of Mississippian time when the Cambridge arch was broadly upfolded and the Table Rock arch was strongly uplifted with the formation of the Humboldt Fault on its eastern margin. The thick Upper Ordovician to Mississippian rocks were completely removed from the crestal portions of the Table Rock arch at this time and the crestal part of the Cambridge arch was stripped of lesser thicknesses of pre-Pennsylvanian sediments.

7. The Pennsylvanian sea invaded

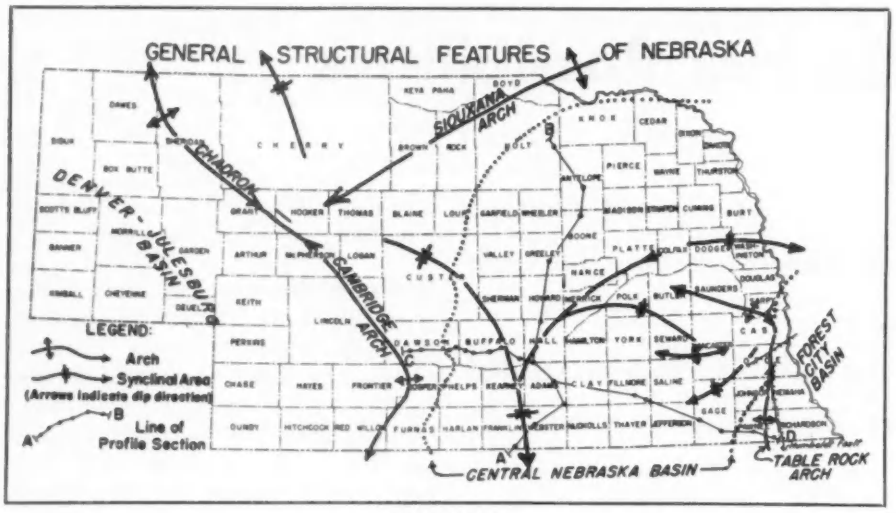


FIGURE 1

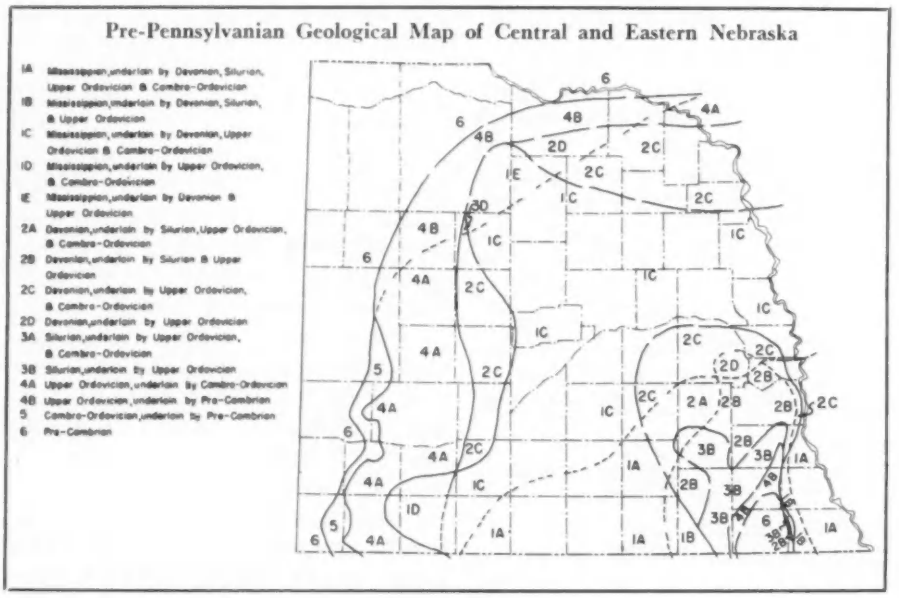

Pre-Pennsylvanian Geological Map of Central and Eastern Nebraska
1A Mississippian, underlain by Devonian, Silurian, Upper Ordovician & Cambro-Ordovician
1B Mississippian, underlain by Devonian, Silurian, & Upper Ordovician
1C Mississippian, underlain by Devonian, Upper Ordovician & Cambro-Ordovician
1D Mississippian, underlain by Upper Ordovician, & Cambro-Ordovician
1E Mississippian, underlain by Devonian & Upper Ordovician
2A Devonian, underlain by Silurian, Upper Ordovician, & Cambro-Ordovician
2B Devonian, underlain by Silurian & Upper Ordovician
2C Devonian, underlain by Upper Ordovician, & Cambro-Ordovician
2D Devonian, underlain by Upper Ordovician
3A Silurian, underlain by Upper Ordovician, & Cambro-Ordovician
3B Silurian, underlain by Upper Ordovician
4A Upper Ordovician, underlain by Cambro-Ordovician
4B Upper Ordovician, underlain by Pre-Cambrian
5 Cambro-Ordovician, underlain by Pre-Cambrian
6 Pre-Cambrian

FIGURE 2

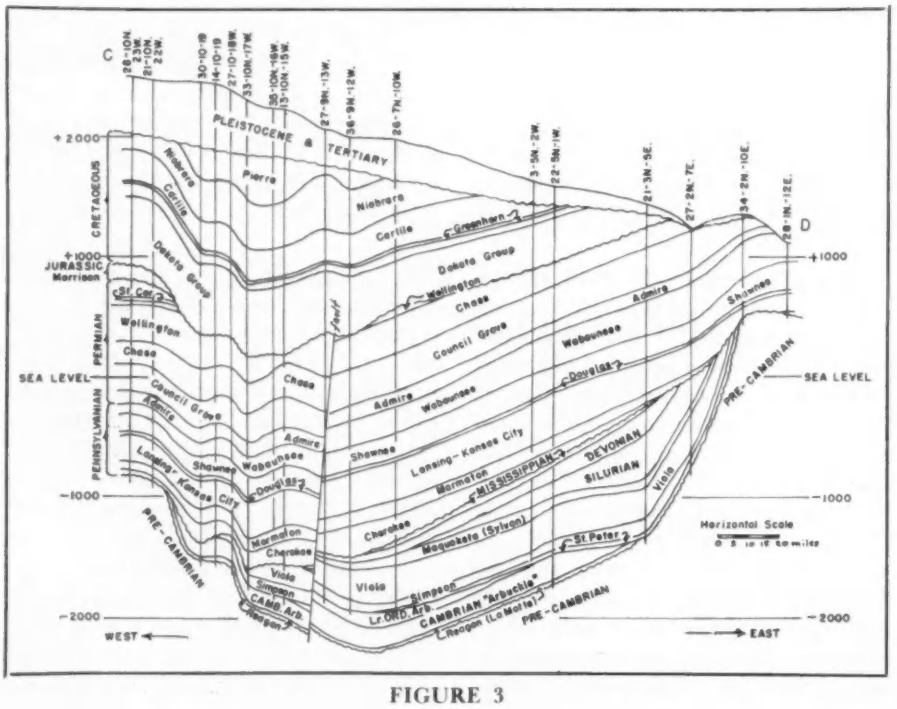


FIGURE 3

the basin from the south and southeast overriding the Cambridge and Table Rock arches and depositing progressively thinner and redder sediments northwestward. Some contemporaneous uplift in connection with the principal arches is indicated by thinning of many subdivisions over the uplifts.

8. Some evidence of rejuvenation of Siouxana arch in early Permian time but as yet inconclusive. Generally no great interruption in sedimentation between Pennsylvanian and Permian.

9. General uplift of area at close of Permian time with no Triassic sediments represented and Jurassic sediments not reaching much east of the west-central part of the state. Siouxana arch actively uplifted for the last time in post-Permian time.

10. Invasion of Cretaceous sea from west with some contemporaneous uplift along Cambridge-Chadron arch.

11. Cambridge-Chadron arch strongly upfolded in post-Cretaceous time followed by extensive erosion in uplifted areas.

12. Continental Tertiary sediments deposited over eroded older sediments. Some eastward to southeastward tilting in post-Tertiary time followed by several glacial advances and retreats in eastern Nebraska.

The present attitude of the rocks in the Central Nebraska Basin is indicated by Figures 3 and 4, north-south and east-west profile sections across the Central Nebraska Basin.

General Nature of Sediments. The Cambro-Lower Ordovician sediments vary in known thickness from more than 400 feet in Burt County and over 350 feet in southeastern Franklin County to zero in the environs of the Table Rock arch and northwestward as the Siouxana and Cambridge arches are approached. A number of wells in the deeper parts of the basin were designed as Arbuckle tests and therefore were only drilled into the upper parts of these rocks. Generally referred to as "Arbuckle" these sediments consist of dolomites with variable and often excellent porosity and permeability. The lower dolomites are usually glauconitic and believed to be Upper Cambrian in age. A basal sand, generally coarse-textured and referred to as the Reagan and LaMotte formations, usually occurs at the base

of the Cambro-Ordovician and tends to thicken northward and northeastward. Locally it is overlapped by the glauconitic dolomites which are believed to represent the Bonneterre of Missouri, at least in part, and are classified as Upper Cambrian. Where the Cambro-Ordovician sediments are more than 150 to 200 feet in thickness, dolomites generally nonglauconitic and believed to be Lower Ordovician in age, are represented, with a comparatively thin sand at the base which is tentatively referred to the Gunter of Missouri. Oil shows in the Cambro-Ordovician have not been noted in wells drilled to date but these rocks include a number of zones which would serve admirably as reservoirs for oil accumulation under the proper conditions.

The Upper (and Middle) Ordovician is represented by a maximum thickness of more than 600 feet in parts of Lancaster, Saunders, Cass and Otoe Counties thinning rapidly to zero southeastward toward the Table Rock arch as its different formations are lost by truncation. These sediments reach farther northward than the Cambro-Ordovician but are slightly less extensive westward. They consist of a lower division of green shales with thin interbedded dolomites which are believed to correlate with the Simpson and vary from 50 feet westward to more than 100 feet eastward and northeastward where the St. Peter sandstone appears at the base in thicknesses of 25 to 60 feet or more, generally thickening to the northeast. Next above the "Simpson" green shales are 150 to 300 feet or more of chert-bearing dolomites classified as Viola. The top division of the Upper Ordovician, classified as Maquoketa or Sylvan, is usually from 50 to 120 feet in thickness although it is locally thinner or absent. In most of the basin it consists of light gray, very granular dolomites with only thin interbeds of shale. The Viola and St. Peter both are sufficiently porous and permeable to be good reservoir rocks.

The Silurian is represented by dolomites which are usually chert-bearing and are restricted to the southeast part of the basin. Thicknesses of more than 500 feet occur in the western part of the Forest City basin and more than 400 feet have been drilled in Gage County, west of

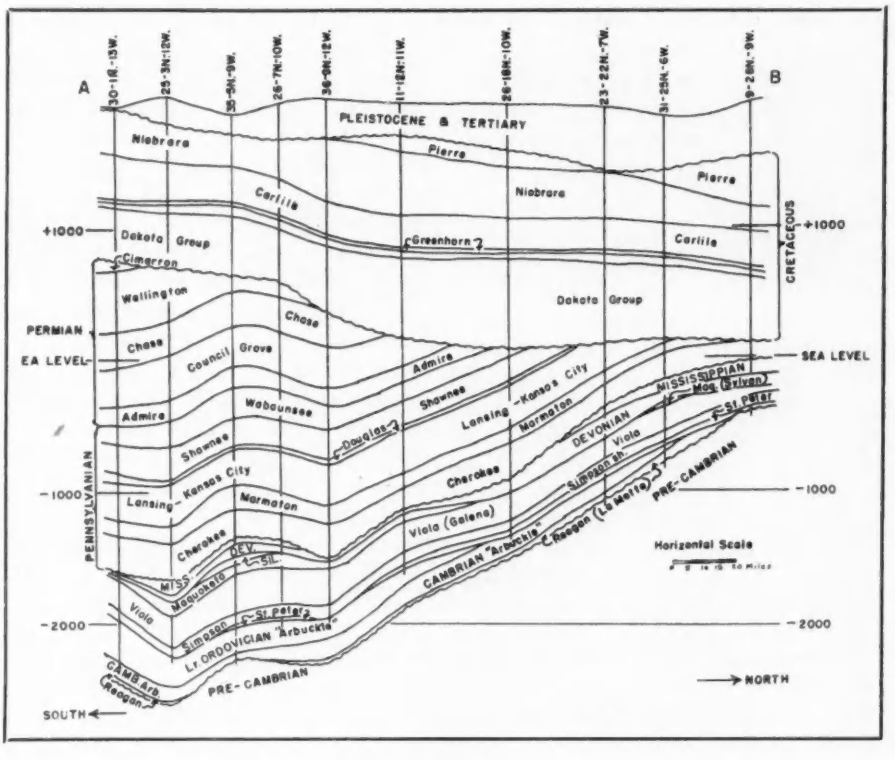


FIGURE 4

the Table Rock arch. There is progressive thinning to zero northwestward and as the Table Rock arch is approached.

The Devonian consists of interbedded dolomites of variable texture with some interbedded dense limestone and green shales and its base is usually marked by a zone of sand-embedded dolomite or dolomitic sand. More than 500 feet of Devonian are represented in eastern Douglas and Sarpy counties thinning to less than 100 feet in the southwest part of the basin. They generally overlap on Viola westward and northwestward and are less extensive than the Upper Ordovician in those directions. The Devonian has been completely removed from the higher parts of the Table Rock arch and the crestal parts of the structurally high in southern Lancaster County (See Figures 1 and 2). Some of the dolomites included have good porosity and permeability.

Although Mississippian rocks are distributed extensively toward the western and northwestern parts of the basin they are comparatively thin except in Burt County where they reach a thickness of 300 feet or more. They have been eroded from an extensive area near and over the Table Rock arch. The Chattanooga shale, which reaches a thickness of more than 200 feet in the deeper parts of the Forest City basin, is generally absent although about 50 feet are present in Burt County. Most of the Mississippian is represented by a limestone which is generally oolitic westward and tends to be very finely crystalline and dense southeastward in the basin. This limestone is believed to correlate with the Gilmore City although it may also include some older Mississippian rocks. In the deeper parts of the Central Nebraska Basin, where more than 100 feet of Mississippian are represented, the upper part consists of cherty dolomites, probably of Osage age.

Lower Pennsylvanian sediments, absent over the higher parts of the Cambridge-Chadron and Table Rock arch, are comparatively thin in the basin and include some coarse basal sands westward which seem to have been derived from the higher parts of the Cambridge-Chadron arch. The Kansas City-Lansing limestones are well developed in much of the basin but thin over the higher arches. "Pinpoint porosity" is common in the thicker limes and some of the oolitic horizons have good "porosity." Most of the oil shows in the basin to date have been noted in the Kansas City-Lansing limestones and three small

wells are now producing from this horizon in Harlan County.

The Permian sediments show a marked tendency to become redder in a northwest direction and evaporites tend to replace the dolomites and limestones.

The Cretaceous rocks are thickest in the west-northwestward parts of the basin where more than 1500 feet are present and thin to zero in the southeast part of the basin by truncation. There is also marked thinning in the northeast part of the basin. The Dakota Group of sandstones and shales, in the lower part of the Cretaceous, are in part correlative to the productive sands of the Denver-Julesburg basin but seem to be progressively less marine and more continental in nature eastward.

Tertiary and Pleistocene Mantle. The Cretaceous and older rocks in the Central Nebraska Basin are generally mantled by from 200 to more than 700 feet of continental Tertiary and Pleistocene materials which do not reflect the structure of the underlying bedrock. Some Cretaceous and older bedrock is exposed along the valley sides of the Republican, Missouri and Big Blue valleys but these areas are too limited to permit extensive structural mapping by surface methods.

Therefore, structural control can only be secured by core-drilling or by geophysical methods. Core-drilling seems to be most effective in the eastern part of the Basin and seismograph most effective in the western part of the basin. Magnetometer and gravity meter investigations may be useful for general reconnaissance but have not given satisfactory results in connection with detailed structural conditions, so far as known by the writer.

Depth to Pre-Cambrian Rocks. The depth to pre-Cambrian rocks varies from a maximum of about 4500 feet, in the deepest part of the Basin to less than 2000 feet in the northeastern part and in the environs of the Table Rock arch. The shallowest pre-Cambrian occurs in the higher parts of the Table Rock arch at depths of about 500 feet while the pre-Cambrian is reached at about 3500 feet over the Cambridge arch. In much of the basin Arbuckle rocks may be reached at about 4000 feet or less.

The lithology of the pre-Cambrian is variable, consisting of granite in some cases, quartzite in other cases, as well as several different kinds of metamorphic rocks. Occasionally red, fine-grained sandstones, that do not appear to be highly metamorphosed, are drilled in the pre-Cambrian and are classified as pre-Cambrian because of their stratigraphic position below the oldest Cambro-Ordovician sediments. The pre-Cambrian is not regarded as a probable source of oil or gas except under unusual conditions where its upper surface may have developed secondary porosity due to weathering and good source rocks occur above. Therefore all wells reaching the upper part of the pre-Cambrian are regarded as complete tests. Tests reaching the upper part of the Cambro-Ordovician "Arbuckle" are also regarded as relatively complete tests as any Cambro-Ordovician oil is most likely to be found in the uppermost permeable part.

Groundwater Quality in Bedrock Formations. Water samples that have been collected and analyzed in the Central Nebraska Basin indicate relatively low mineralization except for the Pennsylvanian and Permian where higher mineralizations are common. This is regarded by some as unfavorable so far as oil and gas possibilities are concerned. However, it should be noted that the water occurring with the oil in the Devonian of the Forest City Basin is also of low mineralization.

Moreover, wells drilled on closed structures in the Basin may be expected to yield much more highly mineralized water. For example, the St. Peter sandstone water in the Forest City Basin usually contains less than 2000 parts per million of total dissolved solids yet it is known to yield water of 30,000 parts per million in the higher, closed parts of the Dawson oil field structure.

Justification for Additional Drilling. Exploratory drilling in the Central Nebraska Basin to date has resulted in little success but it should be remembered that this is an area of 25,000 square miles or more and less than 100 tests have been made which can be regarded as comparatively complete tests in the region where pre-Pennsylvanian rocks are present.

The entire sedimentary section can be tested with comparatively shallow wells generally under 4500 feet in depth. Therefore deep and expensive drilling is not involved. Unusual drilling conditions do not exist which make drilling operations difficult when ordinary care is used and adequate drilling mud is employed.

Although the Dakota Group sandstones are not regarded as a highly favorable oil or gas horizon in this basin, there are a number of lower horizons where conditions seem to be favorable. Some of the limestones in the Kansas City-Lansing Groups of the Pennsylvanian may be regarded as good prospective horizons where adequate porosity and permeability are present under proper structural conditions. Some of the Devonian dolomites are adequate reservoirs but probably less favorable than in the Forest City Basin because of the general relationships. The Viola dolomites generally have good permeability and porosity and the underlying Simpson green shales or overlying Pennsylvanian shales may be favorable oil source rock. The St. Peter sandstone, at the base of the Simpson, is often an excellent reservoir rock. Several different horizons in the Cambro-Ordovician are good reservoirs and may contain oil in commercial quantities where closely associated with satisfactory oil source rock.

The varied sedimentary and structural history of the basin is certainly indicative of possibilities that good traps for oil or gas accumulation may have been formed and preserved as such in some parts of the basin. The presence of several major unconformities, i.e. at the base of the Cretaceous, at the base of the Pennsylvanian and at the top of the Cambro-Ordovician introduces other speculative possibilities. Moreover, locations which may adequately test Pennsylvanian structure may be poorly located as pre-Pennsylvanian tests and Cretaceous structure may be quite different than Pennsylvanian and older structures.

Although the Central Nebraska Basin may not become a large oil producing area it is certain that the region presents a number of interesting possibilities that can be tested at comparatively small per well expense. Therefore it seems that further exploration is completely justified and may result in some important new discoveries. —**The End**

AVAILABLE JOHNSTON by AL CAPP

WHO IS YO', AN' WHAR IS YO' GOIN'?
AH IS AVAILABLE, AN' HE IS ACCURATE JOHNSTON—AN' WE IS GOIN' T' TEST A OIL WELL!!
SMACK OUT HERE, IN TH' OCEAN?
YAS'M!!—US JOHNSTONS TEST OIL WELLS, ANY-WHAR, ANY TIME—AN' FAST!!
COME BACK!! TELL ME MORE!!
CAIN'T, MA'M!!—WHEN WE GO OUT T'TEST A WELL, WE CUTS LOST DOWN-TIME TO A MINNY-MUM!!

C-548

Copr. Capp Enterprises 1954

JOHNSTON TESTERS

first in drill stem testing

HOUSTON, TEXAS

LOS ANGELES, CALIF. • CALGARY, CAN.

FORMATION AND CASING TESTING — JOHNSTON

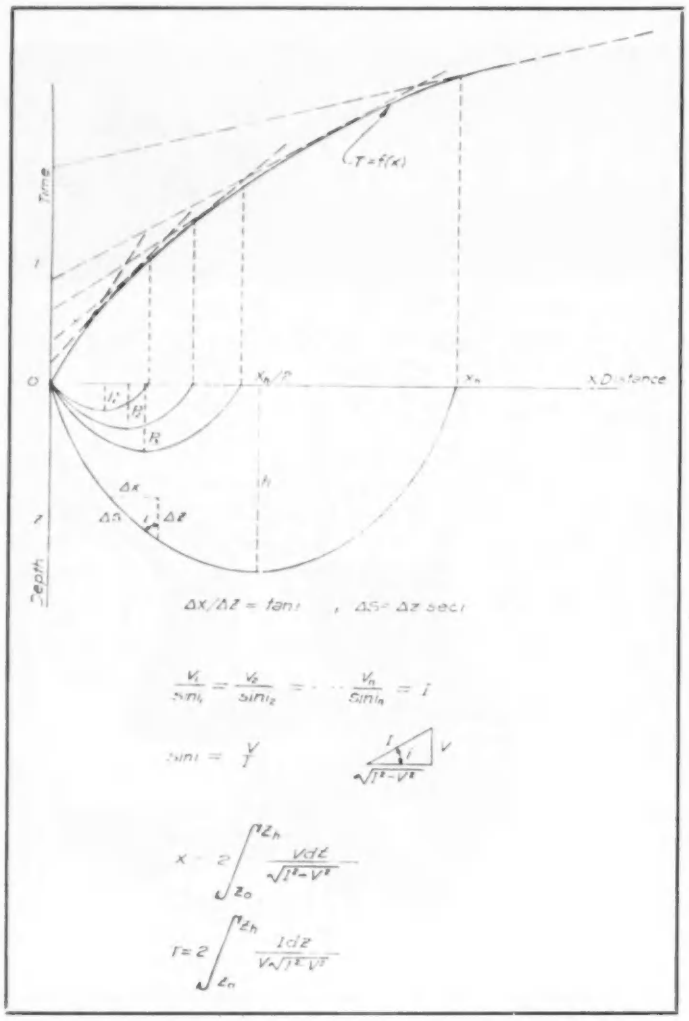

Time
Depth
X Distance
T=f(x)
$\frac{V_1}{\sin i_1} = \frac{V_2}{\sin i_2} = \cdots = \frac{V_n}{\sin i_n} = I$
$\sin i = \frac{V}{I}$
$x = 2\int_{z_0}^{z_h} \frac{V dz}{\sqrt{I^2 - V^2}}$
$T = 2\int_{z_0}^{z_h} \frac{I dz}{V\sqrt{I^2 - V^2}}$

Fig. 1—General equations which apply to any curved path theory, regardless of the assumption describing the velocity-depth distribution.

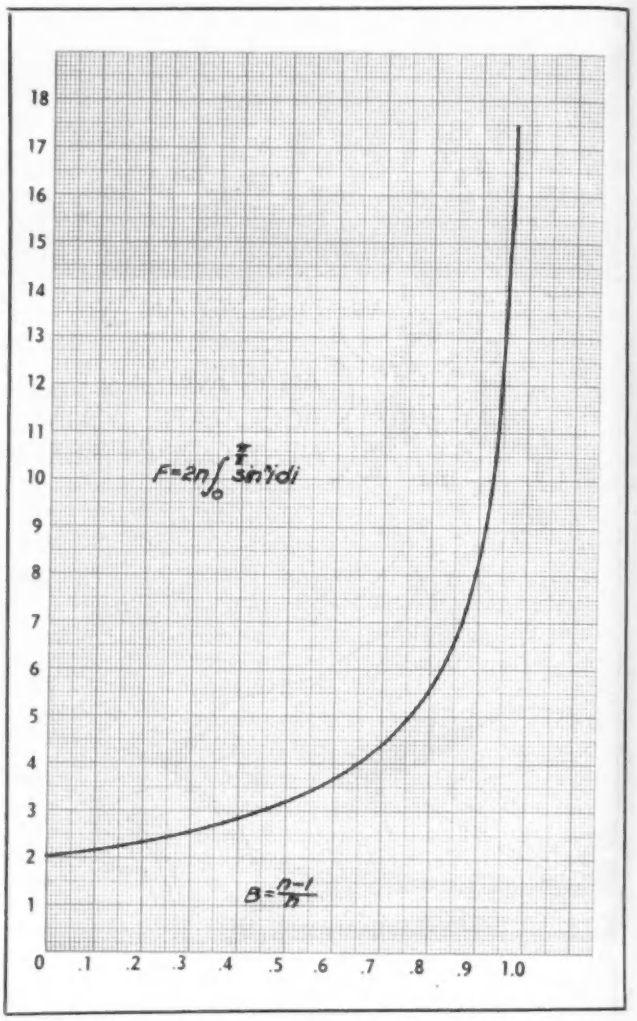


Fig. 2—Curve showing the relation between "F" and "B" is indicated here.

Computing Weathering Corrections For Seismograph Shooting

Velocities of rocks near surface are variable, and corrections must be made for variations through this "weathered" layer.

By E. J. HANDLEY, Executive Vice President,
Midwestern Geophysical Laboratory, Tulsa

IT IS COMMONLY recognized in geophysical surveying that weathering computations must be made to correct for the errors in observed travel times which are due to local variations in the surface and near-surface rocks, and which variations are not related to subsurface structure. The surface and near-surface rocks characteristically exhibit variable velocities because of rock differences due to the effects of weathering, differences in compactness and consolidation, and local variations in sedimentology and lithology.

Rock types, and therefore rock velocities, may show extreme variations both laterally and vertically from any given point in almost any area. Present streams and ancestral streams often create conditions exhibiting abrupt changes in near-surface velocities. It is generally possible to drill through the low-velocity-layer, bottoming the hole in geological beds that are more or less homogenous and have reasonably constant velocities, both vertically and horizontally, or if the velocities do change, they change at a rate sufficiently slow that they do not be-

MODERN SCHEDULES DEMAND—POWER...

FLUID POWER

Vehicles that haul 75 ton loads... Shovels that handle 16 yards and more at a single bite... these are but two of the many juggernauts that move mountains or mole hills... that give industry *higher production at lower cost.* And the key to velvet-smooth control of all this harnessed energy is Fluid Power!

Mine, Construction, Marine, Oil Field, Farm and Materials Handling Equipment attain ever-increasing productivity through the rugged dependability of Fluid Power. Machine Tools, Presses, Paper Machinery, Petro-chemical and other processing equipment achieve greater automation plus micrometric precision through Fluid Power.

There are three divisions of The New York Air Brake Company which concentrate on the development of advanced design hydraulic equipment for this Fluid Power. Thus, from a single source, industry may have the ideal component for the specific function. . . . Gear, Dual-Vane and Piston Pumps, embracing a full range of capacities and pressures to 5000 psi, and Motors, Control Valves and Cylinders to develop complete hydraulic circuits.

In addition to Fluid Power, industry finds the answers to its liquid handling problems in Aurora and Kinney Pumps. "Any material that can be pushed through a pipe" . . . from gasoline and alcohol to tars, sludges, slurries and other heavy semi-solids ...and the less dramatic tasks of sump, deep well, boiler feed, and household needs are all dependably handled by these famous pumps.

Write today for literature containing hundreds of ideas for you to improve your product, increase production and lower costs.

DUDCO DIVISION
Hazel Park, Mich.
Dual-Vane Hydraulic Pumps, 3 to 120 gpm; Fluid Motors, 7 to 140 hp; 2000 psi operation. Piston-Type Pumps for 5000 psi.

HYDRECO DIVISION
Cleveland, Ohio
Gear-Type Hydraulic Pumps, 3 to 120 gpm; Fluid Motors, 3 to 52 hp; Cylinders; Control and Auxiliary Valves; 1500 psi.

WATERTOWN DIVISION
Watertown, N. Y.
Railroad air brake valves for freight and passenger equipment, STRATOPOWER Hydraulic Pumps for Aircraft, to 3000 psi.

KINNEY MANUFACTURING DIVISION
Boston, Mass.
Rotating Plunger and Heliquad Liquid Handling Pumps, to 3000 gpm. Vacuum Pumps, 0.2 micron, evacuate 1800 cfm.

AURORA PUMP DIVISION
Aurora, Ill.
Liquid Handling Pumps, Centrifugals, 4000 gpm, 500 ft. heads. Turbine-Types, 7000 gpm. Condensate Return Units.

THE NEW YORK AIR BRAKE COMPANY

230 PARK AVENUE NEW YORK 17, N. Y.

come a troublesome source of error in making relative dip and depth computations.

However, in some areas it is impractical to drill holes to such reasonably "constant velocity" rock-layers, either because such layers are too deep or perhaps because drilling conditions are too difficult. Since velocities change most drastically quite near the surface, layers may therefore exist below practical shot-hole drilling depth, wherein either the velocity varies or the thickness of the low velocity layer varies. If it is impractical to drill through the low velocity layers and make weathering computations using measured up-hole times, then the thickness of the low velocity layers must be computed. Since only times and distances are observed, these data must be used and generally satisfactory weathering corrections can be computed for the various layers by means of the first-arrival times obtained at the various detector positions.

If the first arrival time-distance curve consists of segments of straight lines, it is known from elementary theory that the paths have penetrated corresponding layers having constant velocities, which velocities are equal to the respective reciprocal slopes of the various straight line segments of the time-distance curve. When the time-distance data, therefore, appears to be best expressed by means of segments of straight lines, we can assume that the rock layers have more or less uniform geological properties with constant velocities and the various depths are computed from the intercepts and slopes obtained from the time-distance curve.

In some areas, the first arrival time-distance data will fall on a uniformly varying curve which cannot readily be approximated by a series of straight line segments, and which curve exhibits a uniformly decreasing slope. This is tantamount to saying that the near-surface rocks are exhibiting a uniformly increasing velocity and cannot be assumed to be in layers of measurable thicknesses. Such a condition can occur where glacial fill or thick sand mantles occur. In fact, such a condition can exist wherever "layer geology" is not present. If the first arrival time-distance data falls on a smooth curve, then the assumption on which the simple theory is based no longer holds, and depths should not be computed based on a multiple layer method of intercepts and slopes. If the velocity uniformly increases with depth, the travel paths are segments of curves rather than a combination of straight lines.

One may assume various mathematical equations relating time and distance and arbitrarily choose constants for such equations to decide which functions best describe the observed time-distance data. From the nature of the data it appears that many time-distance curves could be described by an equation in which time increases as an increasing function of distance. If the equation for the time-distance curve is known, it is then theoretically possible to compute the equivalent vertical time for any given depth of penetration.

On Figure 1 are shown the general equations which apply to any curve path theory regardless of the assumption describing the velocity-depth distribution. It may be observed in passing that the general equations describing time and distance in terms of velocities and depths are integrals involving the square root of polynominals. For many velocity-depth assumptions these equations result in elliptical and hyperbolic integrals which are indefinite and therefore result in rather complex mathematics.

From fundamental considerations it is apparent that the horizontal distance at the surface associated with a given travel-time is a function of velocity and depth and that the travel-time is similarly a function of velocity and depth. Therefore, if one assumes a relationship between velocity and depth, it is possible to solve the general equations describing time and distance in terms of one variable. Normally, therefore, one first assumes an equation describing how the velocity varies with depth and then proceeds to develop the curved path theory based on that velocity assumption. However, if an equation has been assumed from an empirical study of the data which will adequately describe observed time-distance curves, then it is possible to compute penetrations directly from the time-distance data without using the associated assumption describing the increase of velocity with depth. It is only necessary that the time-distance curve be smooth and that the velocity continuously increase with depth. The Herglotz-Bateman equation has been so used by tectonic seismologists for many years. A form of this equation was utilized in applied seismology by Ewing and Leet many years ago.[1]

The general curved path equations yielding a value for the penetration based on the assumption that the time-distance curve is a root or exponent function was solved by E. V. McCollum in the early 30's.[2] If the time-distance equation is of the form in which time is equal to a constant times a root of the distance, it can be shown that the instantaneous velocity is of the same form and similarly is equal to a constant times a root of the depth. It is well known throughout the geophysical profession that Ernest Blondeau, of G.R.C., developed a complete theory for weathering computations in which the near-surface velocities were assumed to increase with depth as described by this type of equation.

Equations 1 to 6 are general equations to be used in developing any curved path theory.

1. $X = f(I, V_z, Z)$
2. $T = f(I, V_z, Z)$
3. $V_z = f(Z)$
4. $I = \frac{dX}{dT} = V_h$
5. $X = 2\int_{\Sigma_o}^{\Sigma_h} \tan i \, dZ$
6. $T = 2\int_{\Sigma_o}^{\Sigma_h} \frac{\sec i}{V_z} \, dZ$

Equation 7 is the Herglotz-Bateman equation used by earthquake seismologists for computing penetrations.

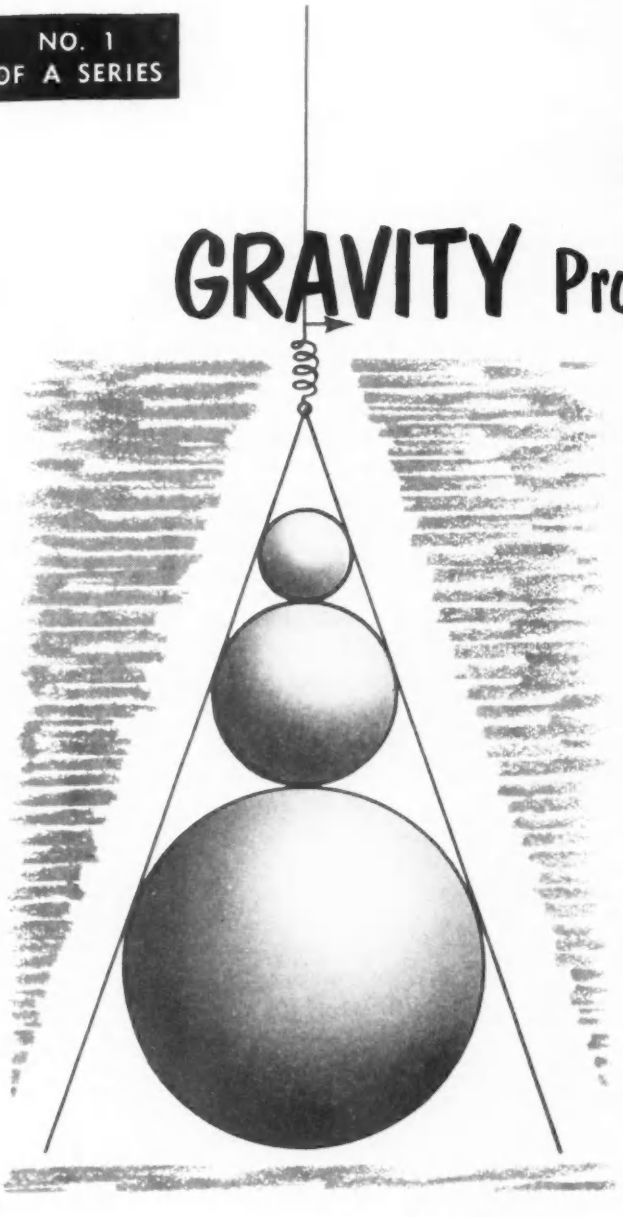
7. $h = \frac{1}{\pi}\int_{o}^{X_h} \cosh^{-1} \frac{T'(X)}{T'(X_h)} \, dX = \frac{1}{\pi}\int_{o}^{X_h} \cosh^{-1} IT'(X) \, dX$

Equation 8 is the time-distance equation referred to above and which, with the proper choice of constants, will empirically describe many actual conditions to the extent that a curve computed from this equation will rather closely satisfy observed first arrival time-distance data.

8. $T = kX^B$

NO. 1
OF A SERIES

Basic Fundamentals of GRAVITY Prospecting for Petroleum



These spheres have equal gravitational attraction at the apex of the cone.

The gravity method of petroleum prospecting consists in measuring differences in the force of attraction between a small mass in the gravimeter and the earth.

All material around the instrument contributes some part of the force, each particle according to its' mass and position. This force is directly proportional to the density and to the dimension of the particle, and inversely proportional to the square of its distance from the meter. The force of gravity also varies with the angular position of the contributing mass, with respect to the plumb-line at the gravimeter.

Doubling the mass particle doubles the force of attraction; doubling the distance reduces the attraction by four; and a particle directly below the instrument contributes more force than one offside.

The observed differences in gravity are very, very small quantities — nevertheless, they are measurable with high accuracy by the extremely sensitive spring-balance gravimeters in common use.

Gravity differences are due to a number of factors such as those of latitude, elevation, topography and subsurface geology. All not due to geology can be computed and removed from the observed gravity data. Those remaining, known as the geologic anomalies, provide clues to the nature of the earth's crust.

Since this crust is made up of rocks of different densities and positions, the geologic gravity-anomaly is a very useful tool for predicting structural relationships.

SSC offers gravity surveys to its clients as part of a complete exploration service. Its gravity division, using effective instrumentation, is staffed with competent and experienced personnel, and is supervised to the end that;

Field operations must be conducted to SSC's high standards, and –

data is prepared by sound analytical methods*, and interpreted by techniques based on the logical correlation of gravity data with geology.

**SSC's electronic computing facilities are available for gravity analysis*

SEISMIC SURVEYS — GRAVITY SURVEYS — PILOT CREWS — LORAC — VELOCITY LOGGING

Seismograph Service Corporation

TULSA, OKLAHOMA, U.S.A.

WORLD-WIDE EXPERIENCE

Equation 9 is the first derivative of equation 8 and is used in solving the general equation 7. It can be shown that if time and distance are described by equation 8, then the velocity depth distribution is described by equation 10.

$$9.\quad T'(X) = \frac{dT}{dX} = kBX^{B-1}$$

$$10.\quad V_z = cZ^{\frac{1}{n}}$$

The exponents of distance and depth are related as shown by equation 11.

$$11.\quad n = \frac{1}{1-B} \text{ or } B = \frac{n-1}{n}$$

At this point we should observe that if we take the logarithm of both sides of equation 8, we obtain equation 12.

$$12.\quad \log T = B \log X + \log K$$

Equation 12 is the general equation for a straight line drawn on log-log paper, and we should recapitulate that if the time-distance equation is that shown by equation 8, then the velocity depth equation is that shown by equation 10. Since equation 12 is the general equation for a straight line, it follows that equation 10 is the only velocity-depth distribution that can be assumed which will result in a linear time-distance relation as described by equation 12. Since equation 10 mathmetically indicates a velocity value of zero at the surface, when Z is O, Banta developed a curved path theory utilizing equation 10 with a constant being added to the depth and this sum being increased by the fractional exponent.[3] From equation 12, however, it can be seen that Banta's equations are practically useful only when this constant is equal to O, thus reverting to equation 10, which was used by Blondeau.

Using equation 10, equation 5 can be solved as shown in equation 13.

$$13.\quad X = h \cdot 2n \int_o^{\frac{\pi}{2}} \sin^n i \, di$$

The quantity as indicated in equation 14 is a definite integral and is a constant for any set of conditions described by a given value of "n".

$$14.\quad F = 2n \int_o^{\frac{\pi}{2}} \sin^n i \, di$$

Therefore, it is seen from equation 15 that the ratio of horizontal travel distance to vertical penetration depth is a constant for any given value of the earth constant "n".

$$15.\quad \frac{X_h}{Z_h} = F$$

In a similar manner utilizing equation 10, equation 6 may be solved describing the travel time as indicated in equation 16.

$$16.\quad T = \frac{h}{C}^{\frac{n-1}{n}} \cdot 2n \int_o^{\frac{\pi}{2}} \sin^{n-2} i \, di = \frac{h^B}{BC} \cdot F$$

The vertical penetration time can be obtained directly from its fundamental definition utilizing equation 10 as shown in equation 17.

$$17.\quad t_h = \int_o^h \frac{dZ}{V_z} = \int_o^h \frac{dZ}{\frac{1}{n}} = \frac{h^B}{BC}$$

It appears, therefore, that the ratio of total travel time to vertical penetration time is equal to the same constant relating horizontal distance to penetration depth described above.

$$18.\quad \frac{T}{t_h} = F$$

Therefore, for any predetermined peel-off depth, the corresponding horizontal travel time can be readily determined by multiplying the peel-off depth by the proper constant "F". The travel time associated with this horizontal distance can be read directly from the time-distance curve. If the travel time is in turn divided by this constant "F" one obtains the vertical penetration time for the predetermined peel-off depth.

$$19.\quad X_h = F\,Z_h, \quad T_h = f(X_h),\ t_h = \frac{T_h}{F}$$

It is evident from equation 20 that "F" is a function of "n"; as shown in equation 11 and 21, "B" is also a function of "n"; therefore, it is evident that "F" is a function of "B". Since "B" is the slope of the time-distance data, when plotted on log-log paper, it is readily obtainable and for each value of "B" a value of "F" is determined and can be read from a table or chart.

$$20.\quad F = 2n \int_o^{\frac{\pi}{2}} \sin^n i \, di = f(n)$$

$$21.\quad B = \frac{n-1}{n} = f(n)$$

$$22.\quad F = f(B)$$

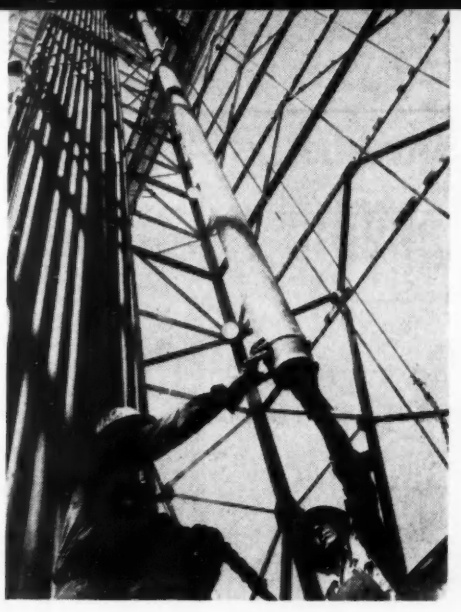
The solution of the definite integral "F", as shown in equation 14, is given by Peirce as shown in equation 23 and 23-A, or 23-B.[4]

$$23.\quad F = \frac{2n \cdot 1 \cdot 3 \cdot 5 \cdot 7 \,(n-1)}{2 \cdot 4 \cdot 6 \,\ldots\ldots\, (n)} \pi/2, \text{ if n is an even integer}$$

$$23\text{-A}.\quad F = \frac{2n \cdot 2 \cdot 4 \cdot 6 \,\ldots\ldots\, (n-1)}{1 \cdot 3 \cdot 5 \cdot 7 \,\ldots\ldots\, (n)}, \text{ if n is an odd integer}$$

$$23\text{-B}.\quad F = n \cdot \sqrt{\pi} \cdot \frac{\Gamma\left(\frac{n+1}{2}\right)}{\Gamma\left(\frac{n}{2}+1\right)}$$

, for any value of n greater than -1

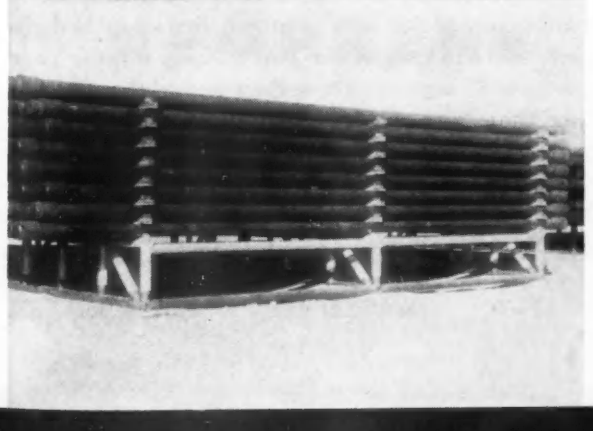


quality CASING

Grade J-55 55,000 PSI minimum yield strength

Grade N-80 80,000 PSI minimum yield strength

Grade P-110 110,000 PSI minimum yield strength



SPANG EXTREME LINE CASING IS:

PRECISION-MANUFACTURED—Spang Casing has the mechanical and metallurgical properties to withstand the high tensile loading, and to resist the extreme pressures found in present-day deep drilling.

STREAMLINED—Interior and exterior contours provide for maximum running efficiency. There are no shoulders to hang-up on hole projections, or to scrape mud seal from the walls of the hole. The integral joint reduces the number of threaded connections by one-half.

EASY TO HANDLE—Very easy to stab, *cannot* be cross threaded, positive shoulder contact engagement prevents overtonging. Only 5 to 7 turns with spinning line and less than one turn with the tongs are needed when running. Spang Extreme Line Casing can be salvaged and re-run repeatedly.

100% LEAK-RESISTANT—This positive resistance to leakage is of primary importance in the choice of high strength casing for deep, high pressure wells. The rugged integral joints of Spang Extreme Line Casing are your assurance of complete leakage resistance under the most severe and variable conditions you can encounter.

Specify the famous Spang Family of tubular products for quality that pays off in the well. Spang Extreme Line Casing is a member of this family which includes:

Spangweld Drill Pipe
Spang Double Seal Shrink Thread Drill Pipe
Spangseal Tubing
Spang Extreme Line Tubing
API Casing and Tubing

To increase corrosion resistance, a phenolic plastic coating can be applied at the mill on all Spang Tubing and Drill Pipe. Ask the National Supply Representative about this Spang service.

For detailed information on how Spang Extreme Line Casing can pay off in the well for you, call the nearest Division Tubular Office listed at left or write Pittsburgh.

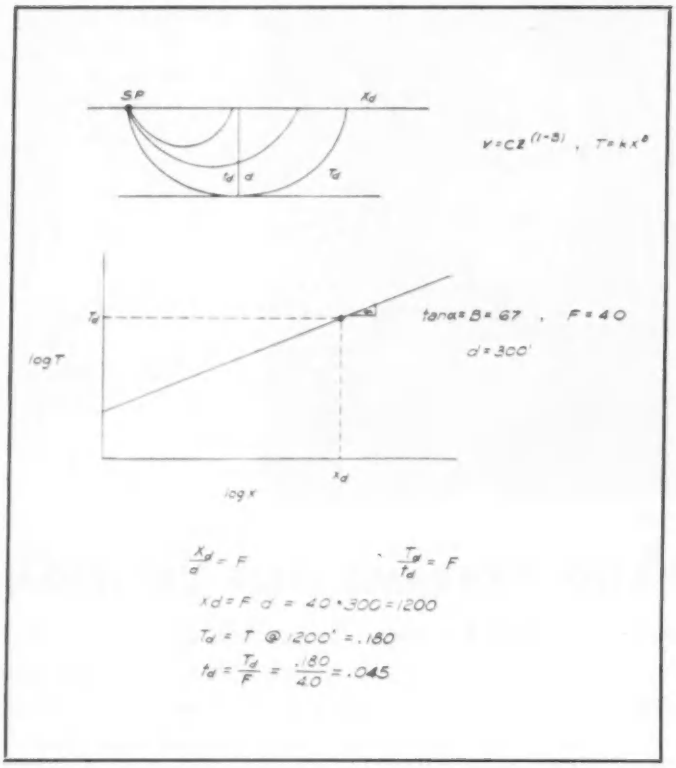


Fig. 3—Computing steps required for the simple, single zone conditions.

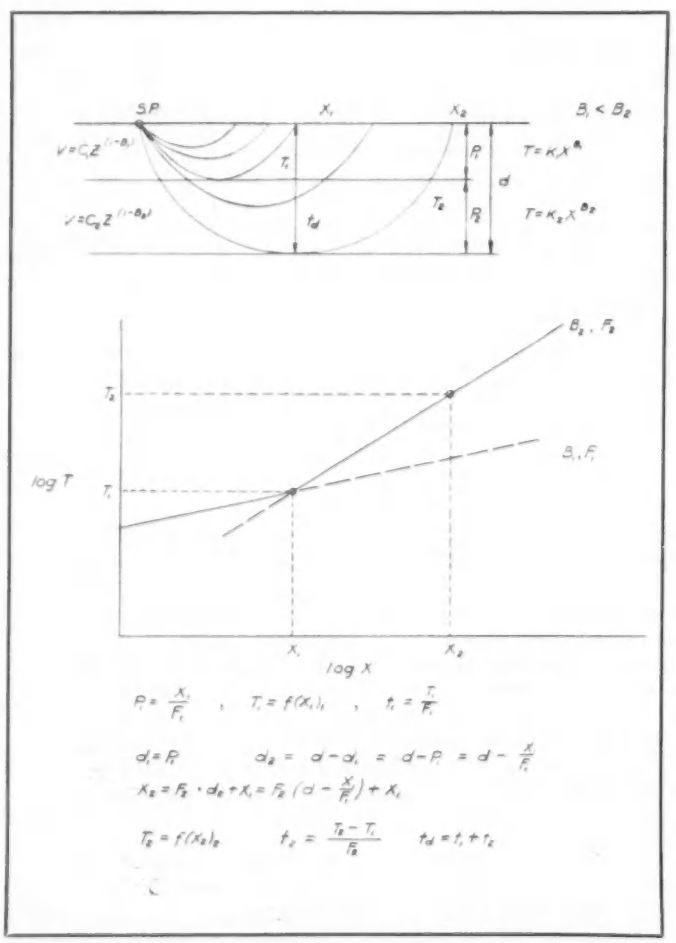


Fig. 4—Computing steps for a normal two-zone condition as set forth in Case 1.

A curve showing the relation between "F" and "B" is indicated in Figure 2.

Since velocities increase more rapidly quite near the surface, it is possible that some depth below the surface the velocity would continue to increase but would do so at a different rate. In which case, one could have a fairly well defined boundary between rock layers, each layer of which however would exhibit a continuously increasing velocity but increasing at different rates. In such areas the first arrival time-distance data would be a series of straight lines on log-log paper rather than one straight line and approximate value for the total penetration can be computed as a summation of penetration times to each layer, by an empirical application of the basic equations 15 and 18. These cases, however, must be solved by an extrapolation of the theory beyond the assumptions originally assumed in the theory's development. Such additional cases, therefore, in which two or more layers are observed, each exhibiting increasing velocities, are of practical importance but are not completely covered by the theory as described in this paper.

The computing steps required for the simple, single zone conditions are outlined on Figure 3.

It is frequently found that the time-distance data, when plotted on log-log paper, are segments of two straight lines, with the deeper segment having the greater slope. This is the normal two-zone condition, and the computing steps are indicated on Figure 4.

Normal Two-Zone Condition

I.

In passing from one layer to another in which $B_1 < B_2$, the change in velocity with depth in the lower layer has decreased, and the knee of the curve, X_1, is the point of departure between the rays travelling in layer 1 and layer 2. The penetration, P_1, is therefore computed from the distance for the extreme path, X_1. The penetration time can be computed from the extreme travel time T_1, which is the coordinate with X_1. The penetration for the second layer, P_2, is obtained by subtracting P_1 from the peel-off depth, d. The equivalent horizontal travel for this amount of penetration is obtained by multiplying P_2 by F_2. The total horizontal travel distance, X_2, for a peel-off depth of d, is obtained by adding the increment obtained above to X_1. The travel time for this peel-off depth, T_2, is read as the coordinate with X_2. The penetration time for the second layer is the difference in the travel paths divided by F_2. The total penetration time is the sum of the times for the two layers.

II.

In passing from one layer to another in which $B_1 > B_2$, the change in velocity with depth in the lower bed has increased, and the knee of the curve, X_1, is still the point of departure between rays traveling entirely in the first layer and those "penetrating" into the second layer. However, rays travelling entirely in layer 1 will continue to be recorded, as secondary arrivals, beyond the distance X_1. Therefore the extreme path in layer 1 emerges at a distance X_{p1}, and the second arrival time T_{p1}, is the co-

"Neoprene stabilizers give us straighter hole—we've used only 3 in 13,000 ft. of drilling!"

— says E. "Butch" Dodson, Tool Pusher, Big West Drilling Co. of Midland, Texas

Courtesy Drilco Oil Tools, Inc., Midland, Texas

"DOWN in the hole, rubber parts really take a beating, with rock, oily mud, and high temperatures and pressures ganging up on them. But our DRILCO neoprene stabilizers sure can stand it! They help make straight hole faster and have cut our crooked-hole problems 'way down.

"Take the hole we're now working on in the Headlee field, near Odessa. We've reached 13,000 ft. in 79 days' drilling, and we've had to replace stabilizers only twice. Thanks to them, we can run 40,000 lbs. on the bit and are only 2 degrees off center at our present depth. No doubt about it—DRILCO neoprene stabilizers have what it takes for accurate drilling, day after day."

Like Big West, many other drilling firms have found neoprene products dependable under rugged service conditions. So whether you're buying stabilizers, drill pipe protectors, piston rubbers, or packers . . . be sure to specify NEOPRENE.

Horace Chambers, driller, looks over stabilizer coming out of hole.

NEOPRENE STABILIZER fits freely around drill collar—enables operator to keep drill centered so that more weight can be put on it. Because neoprene resists abrasion, oil and temperature extremes, these stabilizers *stay* on the job, even under toughest hole conditions.

FREE! THE NEOPRENE NOTEBOOK. Every issue contains interesting stories, illustrated case histories and new applications of neoprene. To receive it regularly, mail the coupon below.

Oil field men know . . . it pays to specify NEOPRENE

NEOPRENE

The rubber made by Du Pont since 1932

DU PONT

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

E. I. du Pont de Nemours & Co. (Inc.)
Rubber Chemicals Division WO-11, Wilmington 98, Del.

Please put my name on the mailing list for the Neoprene Notebook.

*Name*_____ *Position*_____

*Firm*_____

*Address*_____

*City*_____ *State*_____

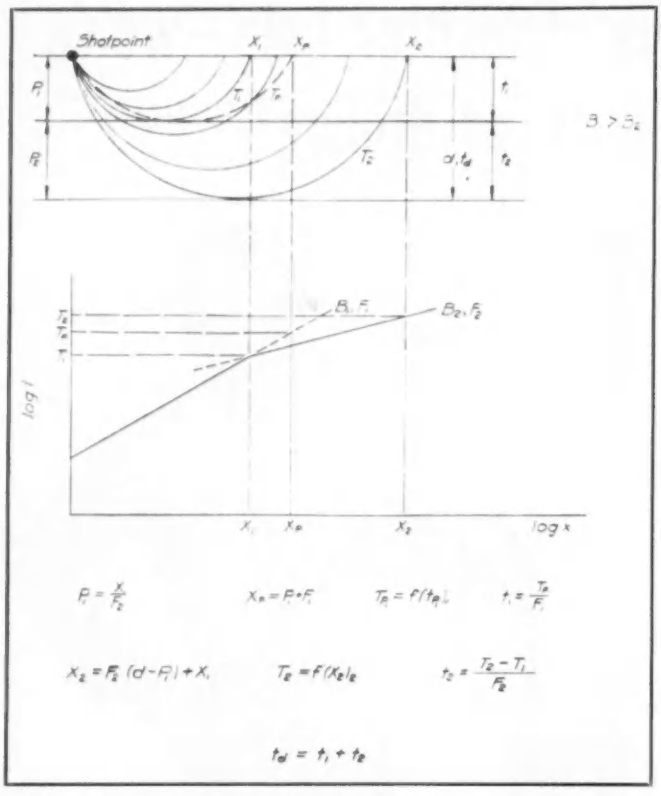


Fig. 5—Computing steps for a two-zone condition, Case 2.

ordinate with X_{p_1}, on the extension of the B_1 line. Times along the line B_1 represent rays that do not reach the boundary before they become secondary breaks. An approximate value for the penetration, P_1, through the first layer may be obtained by dividing the distance to the knee, X_1, by the F_2 value for the second layer. This penetration value if multiplied by F_1 will give the distance, X_{p_1}, at which the extreme path through the first layer emerges. The travel time T_{p_1}, is the coordinate of X_{p_1}, on the B_1 line. The first layer penetration time t_1 is this travel time divided by the F_1 value for the first layer. The penetration through the second layer is multiplied by its F_2 value to obtain the incremental distance to be added to X_1, to obtain the X_2 value associated with d, thus enabling T_2 to be read. The solution is then obtained as in Case I.

In summary it can be said that in some areas the near-surface velocities appear to increase rather uniformly with depth down through a considerable thickness of near-surface materials. When such a condition exists the observed first arrival time-distance data will appear to fall on a smooth curve and should not be approximately represented by a series of segments of straight lines. In this event, multiple layer computations involving intercepts and slopes and assuming straight line paths is not applicable. If an empirically determined time-distance equation is a simple increasing function, then the velocity distribution function is a similar equation, and for any given set of data the penetration time can be rather easily computed for an assumed predetermined peel-off depth. The above theory is complete only so long as the assumptions involved are valid.—**The End.**

REFERENCES

[1] Maurice Ewing and L. Don Leet, "Geophysical Prospecting—1932," AIME.

[2] Personal communications.

[3] "A Refraction Theory Adaptable to Seismic Weathering Problems," *Geophysics*, Vol. 6. pp. 245-253.

[4] B. O. Pierce, "A Short Table of Integrals," Ginn & Co., N. Y.

more money in the bank . . .

YOU SAVE when you log as you drill with Geolograph because Geolograph gives the driller the information he needs to do the most efficient job! Shallow or deep . . . you get more for your drilling dollar with Geolograph on the job!

GEOLOGRAPH

MECHANICAL WELL LOGGING SERVICE

P.O. Box 1291 • Oklahoma City 1, Okla.

Farmington, New Mex. • Liberal, Kan. • Oklahoma City, Okla. • Bakersfield, Cal. Abilene, Houston, Odessa, Lubbock and Wichita Falls, Tex. • Shreveport, and Baton Rouge, La. • Casper, Wyo. • Glendive, Mont. • Sterling, Colo. Edmonton, Alberta, Canada

About the Author

E. J. HANDLEY, executive vice president of Midwestern Geophysical Laboratory, Tulsa, graduated in 1933 with a B.S. in engineering physics from the University of Oklahoma. In 1934 he joined Continental Oil Company and served several years as party chief. From 1943-45 he was geophysicist for British-American Oil Company and then joined Shell Oil Company as a seismograph supervisor. He was vice president in charge of all field operations with Century Geophysical Corporation from May, 1946 to March, 1950, and was a director and an original incorporator of that firm. He has been with Midwestern since 1950 and helped organize that company.

Exploratory Drilling . . . in September and First Nine Months 1954-1953

State or District	MONTH OF SEPTEMBER, 1954													FIRST NINE MONTHS, 1954																
	Productive Tests									Total Productive	Unproductive Tests			Total Exploratory Tests	Productive Tests									Total Productive		Unproductive Tests			Total Dry		Total Exploratory Tests	
	New Fields			New Pays			Extensions								New Fields			New Pays			Extensions										
	Oil	Dis.	Gas	Oil	Dis.	Gas	Oil	Dis.	Gas		Wildcats	New Pays	Outposts		Oil	Dis.	Gas	Oil	Dis.	Gas	Oil	Dis.	Gas	9 Mo. 1954	9 Mo. 1953	Wildcats	New Pays	Outposts	9 Mo. 1954	9 Mo. 1953	9 Mo. 1954	9 Mo. 1953
Alabama											4			4												49			49	60	49	60
Arizona																										8			8	6	8	6
Arkansas							1			1	15			16	2		1	2		1	2			8	25	82		4	86	90	94	115
California	3		1	2						6	29			35	15		3	8		1	3		2	32	58	257		2	259	353	291	411
Colorado	6		1				1			8	53		2	63	36	4	12	2		1	2		1	58	37	386		8	394	222	452	259
Florida											2			2	1									1		24			24	28	25	28
Georgia																										7			7	5	7	5
Idaho																										1			1	4	1	4
Illinois	2			6			6			14	42			56	19			25			45			89	63	434			434	336	523	399
Indiana	1									1	16			17	9		2							11	34	172			172	272	183	306
Kansas	13		6							19	70			89	84		20	4		1	4		1	114	129	572		1	573	674	687	803
Kentucky											5			5	21									21	21	38			38	88	59	109
Louisiana	2	3	1	4	4	1	4			19	34		2	55	24	20	14	35	30	9	5	2	2	141	104	285		14	299	298	440	402
North Louisiana				1			2			3	19		1	23	4	1	3	6	2	3	2			21	23	113		3	116	151	137	174
South Louisiana	2	3	1	3	4	1	2			16	15		1	32	20	19	11	29	28	6	3	2	2	120	81	172		11	183	147	303	228
Michigan											17			17	9						1			10	16	158			158	184	168	200
Mississippi	1		1							2	19			21	4		1					1		6	21	124		4	128	146	134	167
Missouri																										6			6	10	6	10
Montana	1		1							2	15			17	5		2	2			1			10	13	75			75	81	85	94
Nebraska	7						1			8	9			17	22		3	1			4			30	21	97		2	99	114	129	135
Nevada															1									1		9			9	8	10	8
New Mexico	2		1	1		1			1	6	13			19	14		30	5	2	1	6		1	59	54	126		1	127	105	186	159
North Carolina																														1		1
North Dakota											4			4	1			1			2			4	11	78			78	49	82	60
Ohio									1	1	2			3							3		4	7	5	11			11	12	18	17
Oklahoma	8		2	3			6			19	57		4	80	82	8	15	22	1	1	52	2	2	185	203	534		4	538	536	723	739
Pennsylvania																									1							1
South Dakota															1									1		10			10	14	11	14
Tennessee																														1		1
Texas	42	11	3	21	4	4	10	1	2	98	364		6	468	414	64	71	184	45	19	83	11	14	905	875	3161		49	3210	3173	4115	4048
Dist. 1 S. Central	3			1						4	36		1	41	22	2	5	2	1	1	7	2	2	44	24	230		2	232	239	276	263
Dist. 2 Middle Gulf		3		1		1	1		1	5	23			28	5	11	11	4	3	3	3	1	2	43	57	205		4	209	211	252	268
Dist. 3 Upper Gulf	1	5		3	3	1		1		15	33			48	16	14	4	52	20	5	2		1	114	122	305		26	331	314	445	436
Dist. 4 L. Gulf-S.W.	3	2		7	1					14	25		2	41	19	21	3	41	16	4	2	6	2	114	152	276		7	283	363	397	515
Dist. 5 E. Central											14			14	2			1			1			4	8	110			110	87	114	95
Dist. 6 Northeast		1								1	17			18	2	3	1	2	2					10	17	124		2	126	114	136	131
Dist. 7-B N. Cent.	13		1							14	99			113	131	1	24	18			8		2	184	187	690		2	692	710	876	897
Dist. 7-C W. Cent.	7		1	2		1	1		1	13	30		2	45	41	4	9	9	1	2	8		2	76	75	276		3	279	262	355	337
Dist. 8 West	3			4			4			11	30		1	42	74	2	3	28	1	2	39	1	1	151	98	306		2	308	281	459	379
Dist. 9 North	10		1	3		1	3			18	52			70	98	4	4	26		1	12		1	146	133	593		1	594	586	740	719
Dist. 10 Panhandle	2						1			3	5			8	4	2	7	1	1	1	1	1	1	19	2	46		1	46	6	65	8
Utah											6			6	2		2							4	9	27			27	33	31	42
West Virginia											1			1												1			1		1	
Wyoming	2		1		1	1				5	15			20	50		5	7	1	1	3			67	25	153			153	93	220	118
Total U. S.	90	14	18	37	9	7	29	1	4	209	792		14	1015	816	96	181	298	79	35	216	16	27	1764	1725	6885		89	6974	6996	8738	8721

Exploration Ahead of 1953

Year's activity apparently headed for new all-time record.

By CECIL W. SMITH, WORLD OIL Staff

EXPLORATORY DRILLING was quite active during September, and the month's 1015 completed tests boosted the year's total to 8738, which was 17 wells more than were completed in the first nine months of 1953. Last year's work set a new all-time high mark, but the current drilling campaign has kept pace and even remained slightly ahead.

The month's efforts were rewarded with 209 successful tests, 175 new discoveries and 34 field extension wells. Oil discoveries numbered 127, 90 new fields and 37 new pay horizons in established fields.

Also on the credit side were 23 new distillate finds, 14 new areas and nine new pays. Gas discoveries totaled 25 during September and they included 18 new gas fields and seven new horizons.

Of the tests completed in the first three quarters of this year, 1764 proved to be commercial producers, 1505 opened new pools and 259 added major extensions to existing fields. A year earlier, total successful wells had numbered 1725.

This year's oil discoveries totaled 1114, 816 new fields and 298 new pays in older fields. New distillate pools amounted to 96 new fields and 79 new pays for a total of 175 new finds. Gas discoveries totaling 216 were recorded during the nine months and they were made up of 181 new gas fields and 35 new gas pays.

In nine months, the producing limits of 259 fields were extended, while a year earlier the total had been 308.

Summary of Results of Exploratory Drilling

ITEM	Sept., 1954	Aug., 1954	NINE MONTHS January-September 1954	1953	Percent Diff.
Oil Discoveries	127	123	1114	1082	+ 3.0
New Fields	90	80	816	792	+ 3.0
New Pays	37	43	298	290	+ 2.8
Distillate Discoveries	23	19	175	126	+ 38.9
New Fields	14	10	96	77	+ 24.7
New Pays	9	9	79	49	+ 61.2
Gas Discoveries	25	23	216	209	+ 3.3
New Fields	18	21	181	173	+ 4.6
New Pays	7	2	35	36	— 2.8
Total Discoveries	175	165	1505	1417	+ 6.2
Extensions to Fields	34	14	259	308	— 15.9
Oil Fields	29	12	216	248	— 12.9
Distillate Fields	1		16	23	— 30.4
Gas Fields	4	2	27	37	— 27.0
Total Prod. Tests	209	179	1764	1725	+ 2.3
Dry Holes	806	885	6974	6996	— 0.3
Wildcats	792	871	6885	6873	+ 0.2
New Pays				1	
Outposts	14	14	89	122	— 27.1
Total Expl'tory Tests	1015	1064	8738	8721	+ 0.2
Percent Productive	20.6	16.8	20.2	19.8	
Percent Dry	79.4	83.2	79.8	80.2	

Industry Spokesmen Put FPC Gas Ruling Squarely Before Public

Oil Progress Week, October 10-16, afforded the oil and gas industry one of its best opportunities to explain to the general public its side of the continuing, serious wrangles over federal controls on natural gas—a topic which long has ranked high on the industry's major public relations program.

And industry leaders took advantage of an audience made receptive through an extensive nationwide program proclaiming the week as one devoted to general consideration of the industry. One principal aim of the speakers was to fully apprise the public of its own stake in the great debate over federal control of the wellhead pricing of natural gas—similar to the stake that same public has in the tidelands and in depletion allowance.

The Texas Mid-Continent Oil & Gas Association's recent annual meeting at San Antonio offered another chance for the industry to lay its cards on the table. In quick succession, too, industry spokesmen leveled warnings against federal encroachment in the natural gas field.

George T. Naff, president of Texas Eastern Transmission Corporation, said:

"The maintenance of this (abundant) supply requires additional reserves as the population . . . increases. Thus continuing the supply at a static rate is not sufficient. There must be incentives for additional development and for thorough exploration."

J. C. Donnell II, president of The Ohio Oil Company, warned that the recent Supreme Court decision compelling the Federal Power Commission to regulate field sales of natural gas entering interstate commerce will bring FPC into conflict with state conservation agencies "with producers caught in the middle."

Henry W. Bass, Dallas, president of the association, said that "whether our business retains its freedom or is gradually absorbed into a socialistic state" depends on the outcome of the controversy caused by the Phillips case decision which places federal control over prices paid independent gas producers.

K. S. Adams, chairman, Phillips Petroleum Company, produced pointed considerations of federal gas control in a recent address before the American Gas Association.

In his words, "Those who championed the cause of regulation (of natural gas) are about to learn that they may have won a battle only to lose the war."

Wisconsin and Michigan, principal advocates of federal regulation, were warned time and time again, Adams says, that federal control of gas producers would be detrimental to gas consumers' interests. But they were unmoved.

So, Adams says, "it is ironical that those two states should be the first to feel the pinch of federal regulation which their officers so zealously sought."

The pinch? Two proposed 30-inch pipe lines from the Gulf Coast to Michigan and Wisconsin, designed to help meet a part of the anxious and waiting markets have been deferred.

But, Adams points out, the "pinch" spills over into other fields: huge amounts of steel and other equipment will not be used for thousands of miles of pipe lines; pumping stations and other facilities will not be built; lost will be related construction jobs requiring much material and many hundreds of workers; gas distributors will lose future gas supplies; gas appliance manufacturers and dealers will lose untold numbers of kitchen ranges, heaters, furnaces, water heaters, clothes driers, and other gas-burning equipment; commercial and industrial enterprises will have less gas, older industrial areas will undergo an economic decline as manufacturing industries move to gas-producing states.

Oklahoma Order May Hurt Wildcat Drilling

Approval of a new producing formula for wells in newly-discovered pools, recently adopted by the Oklahoma Corporation Commission, threatens to curtail shallow wildcat drilling. Formerly, operators were given a blanket allowance of 150-barrel allowable for 60 days regardless of depth of well or other factors.

The Commission has approved an order which sets up a new formula whereby the allowable increases with well depth. The Commission also can raise or lower another variable factor in the formula to drop allowables when there is an abundance of oil, or increase them when oil is scarce.

The new formula works like this:

If the Commission decides on a market demand factor of 100 percent, a well 4000 feet deep in a discovery pool would be given an allowable of 38 barrels a day. However, a well 15,000 feet deep would get an allowable of 475 barrels. A well would have to be at least 10,000 feet deep to get the old 150-barrel allowable.

Massena Murray, director of conservation for Oklahoma, said the new ruling probably will curtail shallow drilling immediately. On the other hand, the official pointed out it would provide a better market factor percentage figure.

Because of the current oil surplus the Commission decreed a market demand factor of 80 percent.

The new formula is based on depth cost and considers other factors such as viscosity, temperatures, greater sand bodies, better productivity index, and larger spacing.

... at 2:00 in the morning!

P.E.S.A.*

* Petroleum Equipment Suppliers Association

Composed of: ***manufacturers*** **whose plants make the finest precision equipment...** ***supply stores*** **who add two other ingredients of value — where you want it — when you want it...** ***service companies*** **who make available to their customers the practical results of the theoretical research of some of the most brilliant scientific and technical men in the world.**

By **RAY L. DUDLEY,** Publisher, and **WARREN L. BAKER,** Editor

Refinery Yields Are Key to Situation

SURPLUS GASOLINE STOCKS continue to darken the United States petroleum industry's otherwise satisfactory economic position. However, the industry can solve this problem if it will properly regulate crude production and refinery operations during the next six months. On the other hand, the situation can become acute by next spring unless the industry exercises extreme caution.

Relative low distillate fuel oil inventories at the start of the heating oil season indicate a need for higher crude production and refinery runs to meet anticipated winter requirements for this product. But this would result in excessive additions to already heavy gasoline inventories. Any action that causes higher than normal winter growth in gasoline stocks will create serious economic hardships next spring.

Consequently, the industry must solve the problem by holding crude production and refinery operations near present rates. The additional distillate output which will be needed can be obtained by adjusting refining yields of this product upward. This would have a double benefit, since yields of motor fuel would be reduced automatically by higher distillate yields.

•

THE REAL PROBLEM is to hold additions to motor fuel stocks to absolute minimum volumes during the low consuming winter period, while making enough distillate fuel oil to meet heating oil requirements.

Reduced refinery runs during the past four months have improved the situation. Gasoline stocks in mid-October were 10⅓ million barrels higher than a year ago, although they had been 22 million barrels larger in mid-June. However, stocks were too big last year also.

Approximately 40 million barrels of motor fuel can be expected to be added to storage between November 1 and April 1. This volume added to the mid-October level of 150 million barrels would boost inventories to dangerously high levels by next spring. Any larger additions would create a serious enough situation as to jeopardize the industry's markets.

CHIEF SORE SPOT is the Indiana-Illinois-Kentucky area. If conditions in this territory can be corrected, the national outlook will be greatly improved as the oversupply of gasoline is largely limited to this area.

Indiana-Illinois-Kentucky gasoline inventories account for more than half of the gain in U. S. stocks during the past year. Stocks in this region are 6 million barrels larger than at the corresponding time in 1953, while U. S. inventories are up only 10⅓ million barrels.

No other section has experienced a substantial growth over 1953 volumes. Gasoline stocks in the Appalachian region are slightly over 1¾ million barrels larger; East Coast is up 1¼ million barrels; North Louisiana-Arkansas and the Gulf Coast are each a little over 1 million barrels higher. The Rocky Mountain sector is up ¾ million barrels.

On the other hand, California's gasoline stocks are down more than 1¾ million barrels; Oklahoma-Kansas is off 1 million barrels, and a small decrease has occurred in Inland Texas.

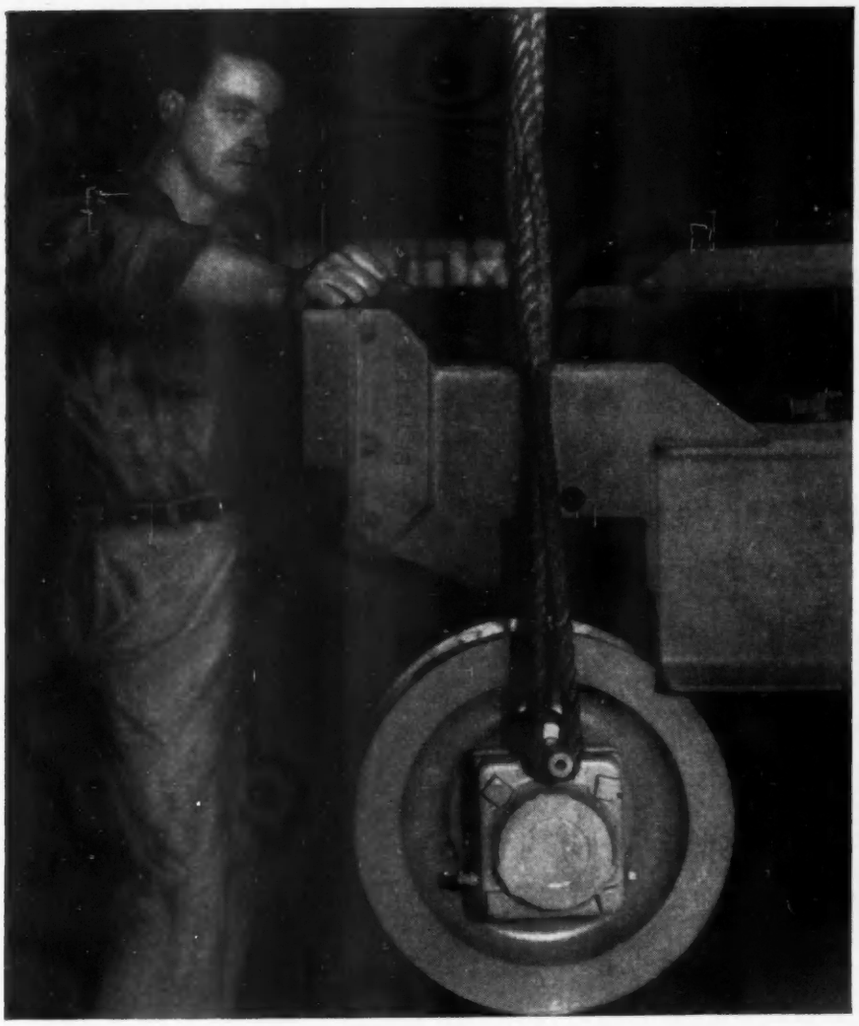
•

THE ONLY WORRY is gasoline inventories, other stocks being at satisfactory levels. With winter approaching, distillate stocks may be somewhat low. Until recently less distillate fuel oil was in storage than in 1953, but by mid-October stocks were 2½ million barrels higher than a year ago. This is not much of an increase in view of the anticipated gain in consumption. However, stocks in the heavier consuming areas are larger than this figure would indicate. Inventories in the Gulf Coast, California and Rocky Mountain are 3½ million barrels below 1953 volumes. While stocks in the remainder of the country are 6 million barrels larger than last year. Most of the increase is in regions where much heating oil is used.

The relative low level of distillate inventories gives refiners a chance to adjust yields to produce more heating oils without too much danger of creating surplus volumes, and this will provide enough heating fuel to meet requirements.

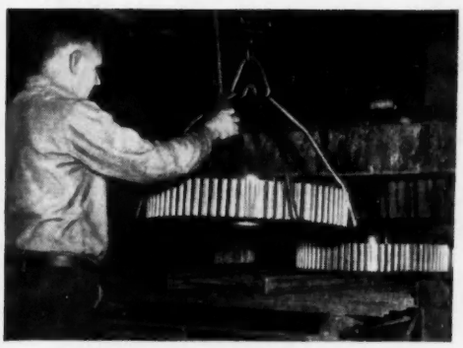
Meanwhile, crude oil stocks also are in good condition. They totaled 273 million barrels in early October, compared with 285 million barrels at the end of June. This is a satisfactory volume.

The Blanks with Extra Strength... yet not a pound of surplus weight



▲ Easy to machine, forged-and-rolled blanks are ideal for the making of sheave wheels.

◀ Crane-track wheels are made from Bethlehem forged-and-rolled blanks by Shepard Niles Crane & Hoist Corporation, Montour Falls, N. Y. The customer cites the longer life of these wheels, and their strength and shock-resistance — qualities valuable in the heavy-duty machines built by the company.



▲ Another common end use: gears.

On this page are shown several uses of Bethlehem forged-and-rolled circular blanks. All these applications require high strength. Yet in each case it is desirable to eliminate needless weight. That's why Bethlehem blanks are the logical choice, for they *do* have high strength without so much as a pound of surplus weight.

Reason: the blanks are made by a process that combines the steps of forging and rolling in a single operation, thereby assuring the density of forged metal and the good grain flow and structure of a rolled product. Result: unusual stress-resistance. Because of this characteristic, customers have frequently found it possible to use thinner sections than they formerly specified.

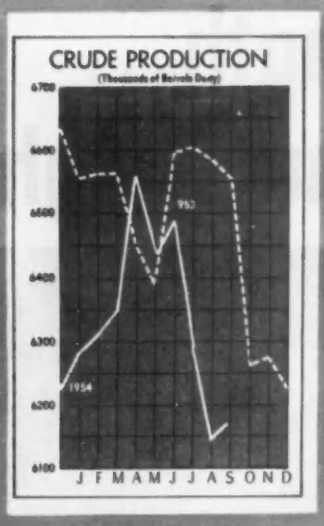
End products made from these blanks include spur, bevel, and herringbone gears, crane-track wheels, sheave wheels, clutch drums, flywheels, turbine rotors, tire molds, and similar parts. The blanks are available in a wide choice of sections, and they can be furnished untreated or heat-treated, as you prefer. Sizes range from 10 to 42 in. OD.

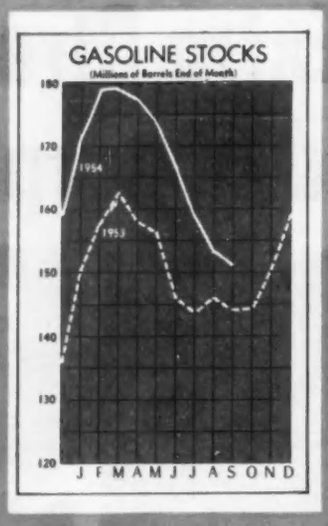
Why not investigate? It could be the first step toward a stronger product . . . and important shop economies we'll be glad to tell you about.

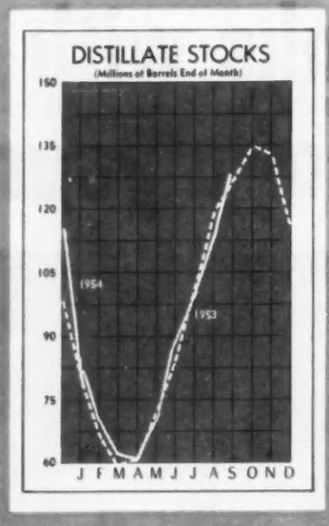
BETHLEHEM
Forged-and-Rolled
CIRCULAR FORGINGS

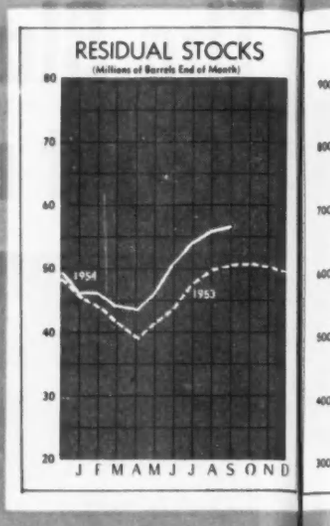
BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

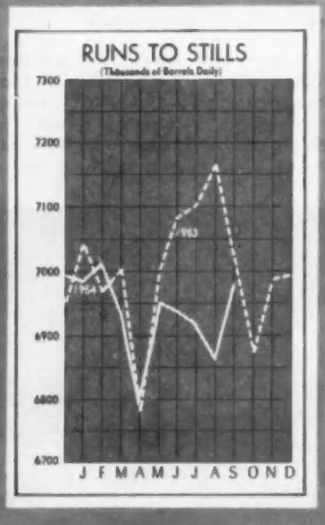
On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation
Export Distributor: Bethlehem Steel Export Corporation

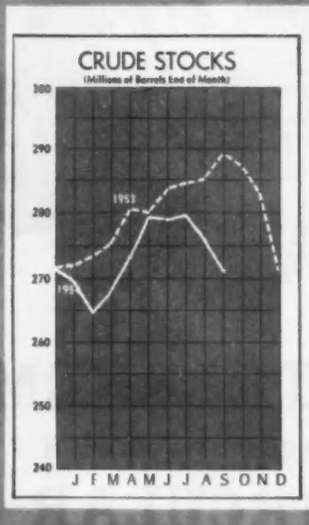












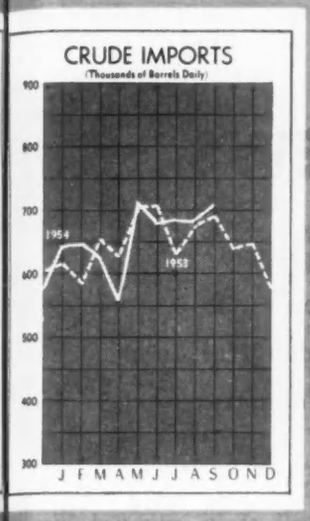
Petroleum Trends in U. S. . . .

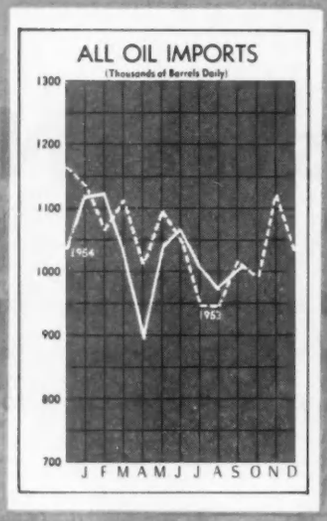
By CECIL W. SMITH, World Oil Staff

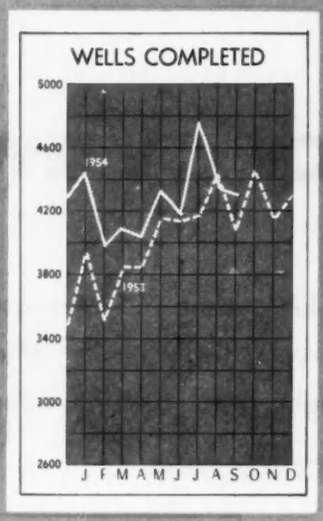
U. S. Crude Production by States

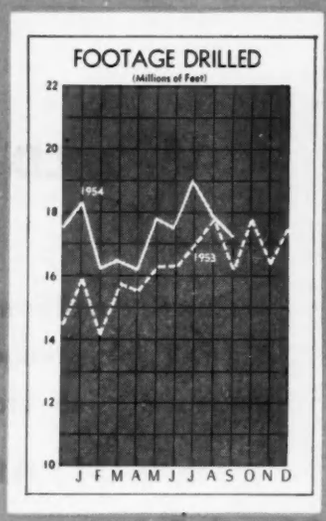
(THOUSANDS OF BARRELS)

STATE or DISTRICT	DAILY AVERAGE PRODUCTION Sept., 1954	Aug., 1954	Sept., 1953	% Diff. Sept., '53-'54	TOTAL PRODUCTION First Nine Months 1954	1953	% Diff. '53-'54
Alabama	4.1	4.2	4.7	— 12.8	1,199	1,295	— 7.4
Arkansas	77.1	76.5	85.1	— 9.4	22,056	22,351	— 1.3
California	955.6	968.0	1,001.2	— 4.6	267,766	272,761	— 1.8
Colorado	131.0	127.9	95.7	+ 36.9	30,715	23,875	+ 28.6
Florida	1.6	1.5	1.5	+ 6.7	417	408	+ 2.2
Illinois	182.0	181.7	158.8	+ 14.6	48,918	43,592	+ 12.2
Indiana	27.8	28.5	35.3	— 21.2	8,363	9,910	— 15.6
Kansas	315.8	320.9	324.9	— 2.8	89,222	90,218	— 1.1
Kentucky	37.3	36.2	32.6	+ 14.4	10,133	8,577	+ 18.1
Louisiana	624.6	642.2	709.3	— 12.0	186,897	192,863	— 3.1
North Louisiana	108.8	110.4	113.4	— 4.1	31,016	31,344	— 1.1
South Louisiana	515.8	531.8	595.9	— 13.4	155,881	161,519	— 3.5
Michigan	31.6	30.6	33.5	— 5.7	8,969	9,200	— 2.5
Mississippi	93.8	92.0	95.7	— 2.0	25,370	26,746	— 5.2
Missouri	0.1	0.1	0.1	.....	51	18	+183.3
Montana	40.2	40.1	31.9	+ 26.0	9,960	8,551	+ 16.5
Nebraska	19.0	19.2	16.9	+ 12.4	5,310	4,500	+ 18.0
Nevada	0.2	.....	.....	.....	4	.....	.....
New Mexico	205.0	205.4	202.8	+ 1.1	55,516	52,167	+ 6.4
New York	11.4	11.0	10.5	+ 8.6	2,596	2,894	— 10.3
North Dakota	13.3	13.5	13.0	+ 2.3	3,868	3,904	— 0.9
Ohio	9.7	9.8	10.2	— 4.9	2,861	2,597	+ 10.2
Oklahoma	489.9	493.7	574.9	— 14.8	141,753	154,244	— 8.1
Pennsylvania	22.7	22.4	30.0	— 24.3	6,916	8,060	— 14.2
South Dakota	0.2	0.2	.....	.....	24	.....	.....
Tennessee	0.1	0.1	.....	.....	12	9	+ 33.3
Texas	2,606.6	2,560.4	2,821.2	— 7.6	735,169	779,234	— 5.7
Dist. 1—South Central	42.3	41.6	40.0	+ 5.8	11,456	10,197	+ 12.3
Dist. 2—Middle Gulf	135.6	130.4	154.7	— 12.4	39,160	43,453	— 9.9
Dist. 3—Upper Gulf	424.4	423.4	468.7	— 9.5	120,447	130,184	— 7.5
Dist. 4—Lower Gulf—S.W.	230.7	226.0	264.0	— 12.6	66,994	71,902	— 6.8
Dist. 5—East Central	43.7	42.4	48.7	— 10.1	12,150	13,527	— 10.2
Dist. 6 Northeast	322.4	315.7	382.4	— 15.7	93,887	104,071	— 9.8
Dist. 7-B—North Central	133.6	125.4	117.0	+ 14.2	34,519	40,650	+ 12.6
Dist. 7-C—West Central	176.6	174.8	166.0	+ 6.4	49,359	45,478	+ 8.5
Dist. 8—West	831.8	817.8	883.3	— 5.8	233,195	250,474	— 6.9
Dist. 9—North	181.4	179.3	188.8	— 3.9	50,907	49,669	+ 2.5
Dist. 10—Panhandle	84.1	83.6	75.1	+ 12.0	22,475	20,530	+ 9.5
Utah	5.2	4.4	4.7	+ 10.6	1,413	1,381	+ 2.3
Virginia	0.1	0.1	.....	.....	11	8	+ 37.5
West Virginia	7.9	8.1	9.3	— 15.1	2,209	2,170	+ 1.8
Wyoming	256.4	248.1	253.4	+ 1.2	69,248	62,664	+ 10.5
Total United States	6,170.3	6,146.8	6,557.2	— 5.9	1,736,946	1,784,197	— 2.6









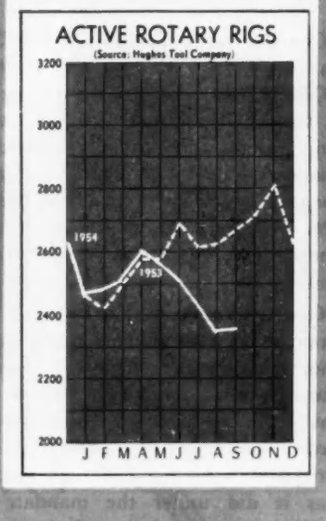
- Refining rate at 4-month high
- Drilling continues at high rate
- Crude output hiked slightly

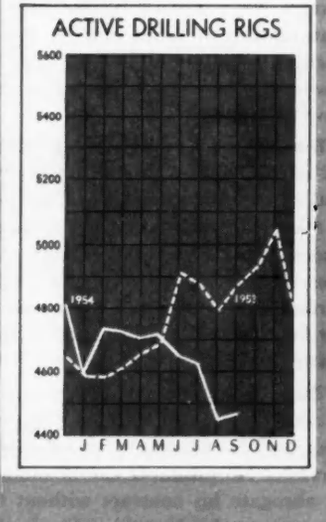
Crude Oil and Refined Products Trends

(THOUSANDS OF BARRELS)

MONTH	CRUDE OIL			GASOLINE		DISTILLATE FUEL		RESIDUAL FUEL		DAILY IMPORTS	
	Production Daily	Runs to Stills Daily	Stocks End of Month	Production Daily	Stocks End of Month	Production Daily	Stocks End of Month	Production Daily	Stocks End of Month	Crude Oil	Total Oils
1952:											
July	6,093	6,927	275,951	3,295	116,566	1,475	85,775	1,237	52,245	597	892
August	6,219	7,118	264,368	3,377	118,592	1,514	104,257	1,252	54,061	632	879
September	6,518	7,017	264,723	3,428	120,991	1,502	117,252	1,230	56,200	615	932
October	6,518	6,883	269,776	3,301	120,062	1,458	120,721	1,203	53,052	643	1,037
November	6,487	7,049	267,852	3,416	129,509	1,510	116,096	1,299	53,069	624	984
December	6,634	6,952	271,928	3,361	136,028	1,509	99,582	1,302	48,706	603	1,165
1953:											
January	6,555	7,042	272,250	3,384	150,518	1,528	80,655	1,307	45,910	616	1,135
February	6,562	6,969	273,589	3,379	157,873	1,505	67,167	1,275	44,178	586	1,066
March	6,531	7,002	275,665	3,319	162,731	1,489	59,802	1,256	41,600	655	1,112
April	6,446	6,781	280,487	3,282	158,032	1,424	61,349	1,219	39,572	628	1,010
May	6,390	7,002	280,308	3,459	156,415	1,400	73,706	1,197	41,795	703	1,096
June	6,595	7,081	283,715	3,467	146,196	1,462	84,504	1,238	43,801	707	1,050
July	6,603	7,103	284,976	3,583	143,916	1,441	102,394	1,224	47,966	629	946
August	6,583	7,163	285,352	3,592	146,050	1,437	119,542	1,222	50,007	672	946
September	6,557	7,023	289,614	3,521	144,184	1,448	126,709	1,203	50,516	692	1,013
October	6,262	6,872	287,541	3,437	144,495	1,462	135,409	1,184	50,820	639	990
November	6,277	6,987	283,021	3,528	150,747	1,463	133,381	1,223	51,267	648	1,120
December	6,238	6,964	276,676	3,628	159,949	1,441	111,944	1,247	49,370	598	1,121
1954:											
January	6,240	6,947	270,811	3,431	171,704	1,550	81,044	1,271	47,474	617	1,143
February	6,379	7,068	266,918	3,476	179,950	1,545	70,390	1,241	47,119	621	1,144
March	6,507	6,923	271,867	3,375	181,297	1,458	60,270	1,168	44,249	654	1,088
April	6,615	6,811	280,310	3,404	177,006	1,374	61,721	1,140	44,362	574	950
May	6,471	7,038	282,250	3,482	177,606	1,372	73,581	1,148	47,009	708	1,021
June	6,500	6,947	285,155	3,483	165,404	1,399	86,325	1,123	50,216	624	999
July	6,242	6,916	284,894	3,480	158,010	1,416	101,657	1,089	54,365	724	1,038
August	6,147	6,859	275,543	3,388	153,608	1,438	116,398	1,092	56,069	683	972
September	6,170	6,980	270,795	3,429	151,979	1,461	127,858	1,097	56,489	710	1,003
Sept., 1954 Change:											
In Month	+23	+121	−4,748	+41	−1,629	+23	+11,460	+5	+420	+27	+31
In Year	−387	−43	−18,819	−92	+7,795	+13	+1,149	−106	+5,973	+18	−10
Week Ended:											
10–8–54	6,152	6,711	273,159	3,304	151,550	1,536	131,198	1,002	56,054	909	1,326
10–9–53	6,313	6,941	286,163	3,355	140,287	1,443	128,926	1,209	53,341	788	1,020

Source: Data for last two months from API; prior monthly data from Bureau of Mines.





WORLD OIL'S VIEWS OF THE NEWS

- Gatchell reaffirms FPC stand . . . Proposed depreciation rules issued . . .
- Need for storage reemphasized . . . Union meeting, merger both doubtful . . .
- "Island" well brought in . . . NLRB issues stock plan warning to industry.

FPC Stands Pat

The Federal Power Commission is standing firm on its warning that no independent gas producer can legally invoke an "escape clause" and shut off service to an interstate pipe line.

Commission General Counsel Willard W. Gatchell reaffirmed this position to WORLD OIL after the Supreme Court, on October 14, refused to reconsider its June 7 decision in the Phillips Petroleum Company case. The decree, which only Congress now can revoke, brought under FPC price regulation Phillips and 4000 other producers who sell to interstate pipe lines.

Gatchell's statement grew out of the action of 14 independent Texas producers who, in September, invoked 30-day escape clauses against the Texas Illinois Natural Gas Pipeline Company, Chicago. The clauses prescribe that contracts can be abrogated when the FPC issues new rules —as it did under the mandate in the Phillips case—regulating production, processing, transmission and sale of gas.

But Gatchell said "these are merely scraps of paper, as far as we are concerned." He added bluntly that escape clauses were outlawed not only by the Natural Gas Act but also by the Phillips decision. "In addition," he said, "all the lawyers I have talked to agree that they have no legal standing."

The Texas producers were directed to file answers by October 29 to two formal complaints by Texas Illinois in which it asked the commission to enjoin the producers from terminating service. After the answers are received, said FPC Chairman Jerome K. Kuykendall, "they will be set for hearing and consideration of the entire matter."

But Gatchell doesn't expect any reversal of the commission's stand. Nor does he look for the producers to actually cut off service. "No producer can abandon service or abrogate his contract without Commission approval," he said. "That's the law."

Asked if he regarded the producers' action as a "test case," he replied that "it probably is—and if it is, we're ready to go to court." He hoped, however, that this would not be necessary.

Meanwhile, the commission and gas circles in the nation's capital appeared reconciled to the finality of the Supreme Court decision in the Phillips case. A commission spokesman said the FPC would push ahead with its controversial price-regulation rules until such time as Congress sees fit to change the law.

A spokesman for the Independent Natural Gas Association of America said: "It's now up to Congress. Everything has been pointing that way. The pipe line industry is not disappointed because it anticipated just what the court did, and has been building toward a remedial campaign in Congress."

Another issue of moment to the gas industry comes before the FPC on November 4. On that date, it will open hearings on price-escalator and so-called "Favored Nation" contracts which are now entangled in complexities of the Phillips edict.

. . . In Final Settlement

The federal government has relinquished its final claim to California's tidelands, and has given the state the net proceeds—$22,041,994—from royalties received by the federal government from offshore California oil developments.

Depreciation Rules Issued

Proposed rules putting into effect the liberalization of depreciation for tax purposes approved by Congress in its overhaul of tax laws have been issued by the Internal Revenue Service.

The new changes will permit the use of the declining balance method of depreciation, or any other similar method which will achieve the same purpose, enabling taxpayers to depreciate about two-thirds of property or equipment cost during the first half of its estimated life. Previously, depreciation has been divided equally over the estimated life of property or equipment.

Storage Need Emphasized

The 1954 report of the Committee on Petroleum Storage Capacity re-established the industry's inherent need for large storage capacity in relation to the amount of crude oil and products moving into and out of such storage in order to conveniently and economically supply the current and forward requirements of customers.

This report, presented at the October meeting of the National Petroleum Council, Washington, D. C., by L. S. Wescoat, committee chairman, indicates that 100 barrels of storage is required for every 47 barrels of inventories contained therein, if the industry is to enjoy complete flexibility at all times in normal operations. The 1952 ratio was 100 barrels of storage to 45 barrels of inventories.

Total storage capacity reported for crude oil, clean products and residual fuel was 991 million barrels, more than half of which was assigned to clean products —gasoline, kerosine and distillate fuel oils.

Another point confirmed by this survey, as in others, said Wescoat, is the large portion of total reported inventories that are unavailable for shipment, i.e., those wrapped up in the industry's far-flung manufacturing, storage and transportation systems, that must be kept intact if the industry is to function. On March 31 these unavailables totaled almost 273 million barrels, or 50.7 percent of the 538 million barrels that were reported as in crude oil, clean product and residual inventories.

Included in the survey for the first time was a study of the underground storage capacity of the industry. Only figures reported were in connection with LPG or LRG, and the total for the U. S. was about 5½ million barrels as of March 31, almost half of which was found to be in Texas inland area.

PENETRATION'S

ONLY PART OF IT!

KONESHOT®

shaped-charge perforating

GETS THE RESULTS

YOU'RE AFTER

That's because KONESHOT—Lane-Wells special shaped-charge perforating—gives you the *accuracy* of Lane-Wells famous depth-measurement system to deliver the penetration you want deep into the exact place you've ordered it put. That's what makes KONE-SHOT the unbeatable combination—penetration plus accuracy!

LANE-WELLS COMPANY®

TECHNICAL OIL FIELD SERVICES

Write for further information on LANE-WELLS KONESHOT

Tomorrow's Tools—Today!®

KZ-84-A

General Offices, Export Office and Plant • 5610 So. Soto St. • Los Angeles 58, California

Los Angeles • Houston • Oklahoma City • Lane-Wells Canadian Co. in Canada • Petro-Tech Service Co. in Venezuela

AAODC Elects Officers for 1955

Elected American Association of Oilwell Drilling Contractors officers for 1955 at the October meeting of the association held in Los Angeles, Calif., were, seated left to right, W. S. Fitzpatrick, Fitzpatrick Drilling Company, Corpus Christi, Texas, vice president, Gulf Coast; H. W. Davidson, Davidson Drilling Company, Midland, Texas, vice president, West Texas and New Mexico; Brad Mills, Dallas, executive vice president; J. V. Dunbar, Dunbar Drilling Company, Denver, president; C. F. Whaley, Chet Whaley Well Servicing Company, Houston, national vice president; R. L. Manning, R. L. Manning Company, Denver, vice president, Rock Mountains.

Standing left to right: R. L. Rose, Drilling and Exploration Company, Los Angeles, Calif., vice president, California; W. L. McClusky, M. J. Delaney Company, Dallas, secretary; J. K. Butler, Oil Production Maintenance, Inc., Houston, vice president, well servicing; John J. Moran, Moran Bros., Wichita Falls, Texas, vice president, North and Central Texas; M. S. Church, Dallas, general counsel.

Not in the picture are Herbert A. Woolf, Woolf and Magee, Tyler, Texas, vice president, Cretaceous and Tertiary Basins; Gail C. Culter, Culter Drilling Company, Tulsa, vice president, cable tools; Dee A. Sikes, Helmerich and Payne, Inc., Tulsa, vice president, Central Mid-Continent; Alva C. Davis, Fairfield, Ill., vice president, Illinois, Michigan, Indiana, and Kentucky; and L. A. Beecherl, McDaniel and Beecherl Drilling Company, Dallas, treasurer.

Union Convention, Coalition in Doubt

What has happened to O. A. (Jack) Knight's much-ballyhooed, in-the-bag merger of his CIO Oil Workers with Elwood Swisher's CIO Chemical Workers?

Things seemed all set when, suddenly, the bottom dropped out of plans for a joint merger convention at Cleveland November 15-17. Also, Knight's vision of a million-man coalition of oil and chemical workers has become a mirage and may fade into oblivion.

While Knight and Swisher both insist the merger will go through—even though belatedly—all is not rosy and it could be that President Dave McDonald of the powerful CIO United Steel Workers, is the difference.

McDonald, whose distaste for CIO President Walter Reuther is no secret, is supposed to have offered Swisher a cool million dollars to align his United Gas, Coke & Chemical Workers with the USW. This would serve three purposes: arm Swisher with enough money for a big organization drive and make him independent of Reuther's bounty; cut the ground from under the OWIU-UGCCW merger; and "take a fall" out of Reuther who has been pushing the merger as the nucleus of a future CIO union that would dominate the oil, chemical, and related fields.

It is well known that McDonald would like to see Reuther replaced as head of the CIO. McDonald denied, at the recent USW convention in Atlantic City, that he was "out to get" Reuther. But talk has that as his objective, and his reported offer to Swisher could be a devious way of going about it. In other words, a sort of divide-and-conquer strategy.

Swisher's executive board met in Washington October 11-12. It was supposed to put its final OK on the new OWIU-UGCCW constitution ratified at the September convention in St. Louis. Vigorous and vociferous opposition developed instead.

Upshot of this was that the board decided to delay the joint convention with the oil workers until some time in March. This knocked Knight's plans into a cocked hat and he, too, ordered his ratification convention postponed until March.

In the interim, Knight has called a November 4 meeting of his strategy board to map plans for a 5 percent wage drive. The meeting will be held in Denver, OWIU headquarters. It is presumed, however, that the main topic will be the faltering merger.

The UGCCW St. Louis convention ratified the combine only after Reuther warned bluntly that, unless it went through, he would deprive Swisher of much-needed organization money.

A UGCCW spokesman in Washington, when asked if the consolidation was in danger because of McDonald's reported offer, said he didn't know. But he also suggested that WORLD OIL ask McDonald whether he was going to back up his million-dollar proposal with "deeds instead of words."

Thus it would seem, at least on the surface, that McDonald has tossed a big wrench into the merger machinery. Time will tell. Meanwhile, the AFL and independent unions Knight had depended upon as future members of his big coalition, have pulled into the shadows. Knight's only explanation was that he won't put real steam behind this campaign until the OWIU-UGCCW combine is in the bag.

Oil To Hold Its Own

Potential effects of atomic energy upon petroleum industry demands should be quite negligible within the next decade or two, in the opinion of Austin Cadle, manager, Economics department, Standard Oil Company of California.

Cadle pointed out recently that when this new source of energy is developed for commercial uses on an economic competitive basis, the almost unanimous present opinion of authorities is that it will act in a supplementary role to the use of fossil fuels. Liquid or solid fossil fuels probably could not fully meet requirements of expanding energy requirements, it is thought, so atomic (and possibly solar and other forms of energy) ultimately will be needed in large volumes.

Finding the amounts of petroleum which will be called for, according to Cadle, constitutes a physical and financial problem of proportions far greater than we have ever faced in the past. There is every indication, he said, that there is a "fascinating brillant future" for petroleum.

Jersey Estimates Reserves

For the first time, Standard Oil Company (New Jersey) has disclosed its gross reserves of crude and condensate. And the figures filed in a preliminary prospectus to the Securities and Exchange Commission is 11¼ billion barrels, about 33 percent of total U. S. reserves.

This reserve figure represents total reserves of more than 50 percent Jersey-owned affiliates. Including other companies in which Jersey Standard is a stockholder, total worldwide gross reserves amount to slightly more than 22½ billion barrels.

While the company does not maintain complete estimates of gas reserves found as a result of exploration and production activities and owned by its subsidiaries, it estimated that net gas reserves within the U. S. now owned by subsidiaries total more than 16 trillion cubic feet. The estimates were given as of December 31, 1953.

Optimism—and Why

The world may enjoy the greatest economic development in history during the next ten years.

This optimistic view was offered recently by B. Brewster Jennings, president of Socony-Vacuum Oil Company, Inc., in an address before The Los Angeles World Affairs Council.

Of acute interest to the oil industry at large are the reasons which this expert gives for his optimism. Speaking on some aspects of the overseas operations of American oil companies, whose capital investments are estimated at more than $4 billion, Jennings, said the subject bears importantly, in several ways, on the well-being of all, "as neither our standard of living nor our national security can be supported without an abundance of oil for ourselves and for those nations that stand with us."

Supporting his views, Jennings said, although Russia and the West still are at odds, "there is some evidence, that for the next several years anyway, Russia will not be disposed to go all out to accomplish its objectives," adding that meanwhile "each side will do everything in its power to improve and strengthen the economy of its orbit."

Reasons for an optimistic outlook, said Jennings, are:

- The successful conclusion of the recent Iranian oil negotiations, which will help revive Iran's economy, make it a strong friend of the West and preserve to the free world a great supply of crude.
- Continued growth in the free world economy generally.
- Plenty of oil is in sight in the sense of proven reserves and ability to produce.

•

Drilling vs. Economics

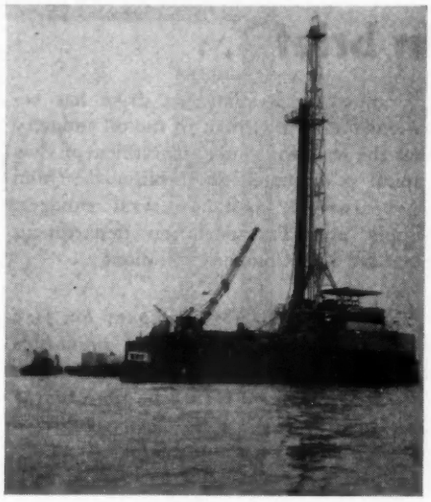
Will the reduction in the drilling rate continue over the next few months?

This question was posed recently by B. Brewster Jennings, president, Socony-Vacuum Oil Company, Inc., after he pointed to the downward trend in the past three or four months in permits issued for new well locations and in the number of drilling rigs in service.

"Just now the industry is admittedly drilling more wells than necessary," he said, "to replace current production and to maintain the historical relation of reserves to production."

But he said that "whatever happens will be the result of many judgments impinging independently on the crude oil market price and on the broad conduct of the crude oil producing segment of the industry."

Thus economic laws are functioning through the independent actions of many individual operators.



A 50-BY-75-FOOT pile-supported wharf adjoins the 75-foot diameter rock-filled circular island from which Monterey Oil Company's Monterey-Texas State 4 was completed in October for a flowing production of 300 barrels a day of 26.4 gravity clean oil through 30/64 bean from the 5906-6280-foot interval. Several wells can be directionally drilled from this island location about 1½ miles off Seal Beach, Calif.

Offshore Well Brought In

Interest in the productive possibilities of California's offshore submerged lands has been given a distinct boost with the announcement by Monterey Oil Company that it had successfully completed its first offshore island project, Monterey-Texas State 3, as a flowing well.

The first producing well to be completed in a strictly offshore island operation in California waters, the project is situated in 45 feet of water at a point some 8000 feet off Seal Beach and about 4½ miles southeastward from the Wilmington oil field.

Marking the discovery of a new field, the well flowed, during a three-day test period, at rates averaging 300 barrels per day of 26.4 gravity clean oil through a 30/64 flow bean, with a pressure of 100 pounds per square inch on the tubing and 750 psi on the casing. Production was from a 374-foot interval between the shoe of the seven-inch, cemented at 5906 feet, and plugged-back depth of 6280 feet. No information was released by the company as to the identity of the producing horizon, but it is presumed it is comparable to one of the several producing formations identified in the Wilmington field. The well was shut in pending installation of facilities for receiving and transporting production.

Representing an expenditure of about $1 million, including the island and adjacent wharf facilities, the well was carried originally to a depth of 10,162 feet but was plugged back to the present producing interval. The well was spudded in on May 22. The project is owned 50 percent by Monterey Oil Company, the operator, and 50 percent by The Texas Company.

The 75-foot diameter island was designed originally to accommodate three wells; the first to be drilled vertically and subsequent wells to be slant-drilled. Situated in 45 feet of water and with deck about 30 feet above the water line, the circular structure is constructed of steel piling and filled with rock and sand, the latter covered with a heavy concrete decking. A 50- by 75-foot pile wharf is situated on the land side of the island. Brown Drilling Company, Long Beach, Calif., contractor on the project, is using a 136-foot mast rig equipped with four 205-horsepower diesel engines. Because of the restricted area, the sub-structure, instead of having eight feet of clearance, was modified to leave 14 feet in order to accommodate engines, mud pump and mud tanks beneath the rig floor.

Before moving out to the island earlier this year, the contractor drilled a conventional well in the Signal Hill area with the rig, drawing out in the yard the exact dimensions of the island and wharf, to make sure re-arranged equipment would operate as designed on the restricted floor area of the offshore location.

An eight-foot concrete splash wall 16 inches thick surrounds the rear two-thirds of the circular island. Fuel, drilling mud in liquid form, fresh water and supplies are barged to the island from Long Beach. Waste water and mud are barged back to the mainland for disposal. A water taxi service transports crews and other personnel to and from the Seal Beach pier.

The company on October 5 was spudding in a second well from the island, but no announcement was made as to which direction it would be drilled nor the proposed depth.

Lease Awards Scheduled

The Department of Interior hopes to make formal awards by November 1 on the $130 million of bids for leases on submerged oil, gas and sulphur lands on the Continental Shelf off Louisiana's coast.

Meanwhile, Secretary Douglas McKay is hopeful that federal-state dispute over the boundary line of Louisiana's tidelands can be ironed out by a joint committee of government-state officials appointed last month.

The dispute concerns lands which Louisiana claims but which the Supreme Court, and later the 1953 Submerged Lands Law, vested in the federal government. A major clash was averted when the committee was created. Both the government and Louisiana had advertised some of the same parcels for lease.

One thing is certain: unless the matter is settled amicably, either Congress or the courts will have to reach the final solution. Attorney General Herbert Brownell, Jr., said his aides are studying "the whole tidelands question." He said lawsuits are possible, but he hopes to avoid them.

Louisiana claims her domain extends at least 10½ miles into the gulf in some areas, and 27½ miles in others. Texas claims 10½ miles.

Work Starts on Fuels Report

President Eisenhower's Cabinet Committee on Fuels Resources is ready to plunge into the task of writing its report and recommendations on future administration policies toward oil, coal and natural gas.

The report must be ready by December 1 so the President can use it in drafting legislative proposals to the new Congress.

The blue-ribbon committee held long hearings—most of them featured by bitter rivalry for the energy market—and set October 20 as the final date for submission of briefs. After it digests these and previous testimony, it will begin work on its report.

Eisenhower appointed the committee last July 30, with the stated objective of computing fuels resources in relation to war emergency needs and "orderly industrial growth." But his primary purpose was to find a way to keep each industry a healthy part of the economy, without one destroying or seriously damaging the other.

Never, perhaps, has such a high-level group been so belabored by rival interests in the hope that their conflicting views will prevail in the committee's report.

At times the three industries were virtually tearing at each other's throats and each made clear that the battleground will shift to the new Congress in January if the committee's recommendations are unpalatable.

Congress will be the final arbiter but it, too, is certain to split wide open when oil and coal state lawmakers square off against each other.

The cabinet committee is headed by Mobilization Director Arthur S. Flemming. Members are the secretaries of state, defense, interior, commerce, and labor and Attorney General Herbert Brownell, Jr., Eisenhower created it after oil and gas circles angrily protested establishment of an inter-departmental committee to look into the ills of coal.

They pointed out that oil and gas also have their problems even though both have cut deeply into the coal market. Independent oil producers, hard hit by imports of cheap foreign oil and increasing competition from gas, urged the committee to propose a firm ban on excessive imports.

The gas people cited the "destructive potentialities" of the Supreme Court decision in the Phillips Petroleum Company case which saddled the Federal Power Commission with price-policing of all gas sold in interstate commerce. Unless there is corrective legislation, they said, gas supplies could "dry up" for want of profit incentive.

Flemming invited state control bodies, along with the oil, gas and coal industries to submit their views by October 20. He said "they will be extremely helpful to the committee in developing its recommendations."

In brief . . .

Competition's unflagging drive has occasioned such a growth in the oil industry that the need for annual investment in new capital is estimated at $5 billion by John W. Boatwright, assistant general manager, Supply and Transportation department, Standard Oil Company (Indiana).

El Paso Natural Gas Company has filed with Federal Power Commission a rate hike application amounting to $18 million, or 15 percent, which is in addition to the $15.2 million increase now being collected by the company but subject to refund.

Magnolia Petroleum Company has spudded in its first wildcat in Texas' offshore waters. The well is ten miles southwest of Sabine and eight miles off the coast of Jefferson County, and is being drilled under a permit for a 13,000-foot test to be drilled from a platform in 36-foot deep water.

Sun Oil Company and Atlantic Refining Company are joint winners of the 1954 silver Founder's Medal, an award by the Drexel Institute of Technology in recognition of the companies' "contribution to the industrial vitality of the eastern seaboard and to the strength of the national economy."

Montana Power Company has filed with Federal Power Commission a request for a permit to import natural gas from Canada for general use in Montana.

Societe Nord-Africaine des Petroles, owned 65 percent by Gulf Oil Corporation, has called off all Tunisian oil exploration. Drilling operations failed to give any indications of oil or gas in the areas in which SNAP has conducted exploratory efforts since 1952.

Imminent is Office of Defense Mobilization's report to be made to the National Security Council on need for oil pipe line transportation to the East Coast during any emergency. Likely, the report will follow along lines of an earlier one by the Oil and Gas Division.

Oil reportedly has been discovered in Switzerland at about 6800 feet; however, the account of the discovery published in a Basel newspaper said it was too early to evaluate the extent of the deposit.

Texas Railroad Commission set the state's November daily crude allowable on a continuing 15-day basis at 2,864,749 barrels, up 64,300 barrels from October 16 permissive flow.

NLRB Rules on Stock Plan

The National Labor Relations Board has put all industry on notice that once a corporation sets up a stock purchase plan for its union employes and to which it contributes, the plan thereafter becomes a legal collective bargaining issue.

The far-reaching decision, rivaling only that in the Inland Steel Company case in 1948, was handed down by a 3 to 1 vote against the Richfield Oil Corporation, and in favor of O. A. (Jack) Knight's Oil Workers International Union (CIO).

In 1953, more than 30 corporations had such plans, covering millions of workers.

The board majority held that the Richfield plan "came within the meaning of wages and other conditions of employment." It said the Labor Relations Act requires an employer to bargain on these matters.

Richfield—supported by a brief filed by the Chamber of Commerce of the U. S.—argued that such bargaining constituted undue interference in management affairs by union control of employes' voting rights as stockholders.

The decision came in the face of recent charges by organized labor that the NLRB was "stacked" against the working man. Voting against Richfield were Chairman Guy Farmer and members Ivar H. Peterson and Philip Ray Rodgers. Member Abe Murdock did not take part and Member Albert C. Beeson dissented.

Defense Units Picked

Dr. Robert E. Wilson, chairman, National Petroleum Council Committee on Oil and Gas Emergency Defense Organization, has appointed two subcommittees on Continuity of Company Operations and Advance Preparations and Plans. The chairman of the board of Standard Oil Company (Indiana) appointed H. G. Mangelsdorf, Esso Standard Oil Company, as chairman of the subcommittee on continuity, and R. G. Arner, Sinclair Oil Corporation, as chairman of the subcommittee on advance planning.

The parent committee is investigating ways and means of meeting oil and gas industry crises which might result from an enemy attack as well as means of rehabilitating losses to assure the U. S. of adequate post-attack supplies of oil and gas.

Appeal for the Future

Westcoast Transmission Company may have to wait until next year to find out when the Circuit Court will hear its appeal from Federal Power Commission denial to grant the company rights to serve the Pacific Northwest with natural gas imported from Canada.

Mr. "M" was the picture of health

Mr. M. was in the best of health, and when we first suggested that he take certain steps in case of death he thought it was a lot of needless trouble. We showed him how our Trust Department could arrange his affairs in an orderly way, and allow his operation to continue after his death.

Following the advice of our Trust Department, he had his lawyer draw up a will for him. And, even though he thought it was a waste of time, he had his wife's will made, too. His finances were set up to run as smoothly and as efficiently as his oil operation. Every future possibility had been taken care of in the plans made by the Trust Department.

Now this story has a twist. Mr. M hasn't died yet. But he lives in Texas, and his wife died early in the year. Had she died without a will, and if her community property share of his operations had not been taken care of by such will, he would have had a sizable part of his estate tied up in court proceedings for many months. He would have missed out on an excellent deal which he was able to make. And now he knows that when he does die his children will benefit, through this orderly financial arrangement, from the energy and hard work he put into building his holdings.

The National Bank of Commerce is geared to help you with your problems. Impartial advice, based on our experience as oil men and money men will help you, too. Oil men **going up** come to the Oil Loan Department of The National Bank of Commerce.

E. O. BUCK, VICE PRESIDENT, OIL LOAN DEPARTMENT

THE NATIONAL BANK OF COMMERCE

OF HOUSTON

Gulf Building, Houston, Texas "The Bank for All the People"

MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION

Facilities of the Oil Loan Department of The National Bank of Commerce are available in Wyoming, Colorado, Nebraska, New Mexico, Texas, Louisiana, and Mississippi.

dubose

U. S. Wells Completed in September and First Nine Months, 1954.

STATE or DISTRICT	NEW WELLS COMPLETED AND FOOTAGE DRILLED											DETAILS FOR JANUARY-SEPTEMBER					Rigs in Operation		
								TOTAL NEW WELLS			Total Footage Sept., 1954	New Wells			Footage				
	Oil	Dist.	Gas	Dry	Water Input	Gas Input	Water Disposal	Sept., 1954	Aug., 1954	Sept., 1953		1954	1953	Percent Diff.	1954	1953	Sept. 30, 1954	Aug. 31, 1954	Sept. 30, 1953
Alabama				4				4	5	9	24,735	57	79	— 27.9	300,715	413,508	4	5	7
Arizona												8	6	+ 33.3	30,774	19,960	1	5	1
Arkansas	41		1	26				68	57	54	227,765	440	367	+ 19.9	1,552,133	1,320,850	31	40	53
California	140		3	52				195	203	188	846,243	1,849	1,914	— 3.4	8,396,097	8,273,800	203	197	259
Colorado	28		1	65				94	120	65	516,440	956	515	+ 85.6	5,268,676	2,637,799	60	70	60
Florida				2				2	5	5	8,259	26	28	— 7.2	159,014	180,362	3	3	3
Georgia										1		7	5	+ 40.0	18,008	13,756	1		3
Idaho													4			22,748			2
Illinois	167		1	124				292	320	189	681,982	2,308	1,463	+ 57.8	5,622,264	3,611,643	292	288	245
Indiana	14		1	45				60	75	120	92,504	606	981	— 38.2	924,171	1,663,291	124	117	162
Kansas	187		27	163			2	379	347	329	1,357,391	3,175	3,457	— 8.2	11,211,421	11,977,677	412	392	430
Kentucky	38		15	56	1			110	125	115	199,605	1,030	881	+ 16.9	1,928,985	1,742,313	93	78	95
Louisiana	215	16	18	107				356	358	256	2,035,329	2,688	1,883	+ 42.8	16,661,204	13,393,778	273	272	266
North Louisiana	145	2	11	52				210	196	116	631,366	1,423	805	+ 76.8	4,180,895	2,995,870	60	57	59
South Louisiana	70	14	7	55				146	162	140	1,403,963	1,265	1,078	+ 17.3	12,480,309	10,397,908	213	215	207
Maryland													4			15,614	5	4	1
Michigan	21			30				51	44	50	137,116	413	448	— 7.8	1,086,495	1,162,099	101	111	117
Mississippi	11	1		26				38	46	29	247,941	310	287	+ 8.0	2,172,936	1,993,326	47	45	43
Missouri									1	8		9	25	— 64.0	9,531	20,645	2	2	
Montana	14		2	20				36	29	64	135,216	259	326	— 20.6	1,014,199	1,425,135	36	38	57
Nebraska	36			16				52	57	33	298,701	325	255	+ 27.5	1,809,308	1,322,398	27	20	18
Nevada									2	1		10	8	+ 25.0	51,218	11,115	3	2	
New Mexico	55		39	25				119	85	142	569,639	899	1,103	— 18.5	4,740,705	6,259,005	115	119	178
New York	27				16			43	43	80	58,769	451	691	— 34.7	658,396	963,889	64	69	105
North Carolina													1			1,570			
North Dakota	20			7				27	27	25	202,872	210	189	+ 11.1	1,471,332	1,418,677	27	28	32
Ohio	27		19	27				73	79	75	139,231	774	721	+ 7.4	1,499,159	1,482,882	188	196	189
Oklahoma	322	2	29	197	3		1	554	564	605	1,863,423	5,994	5,389	+ 11.2	20,362,206	18,985,841	700	678	596
Pennsylvania	16		21	7	13	5		62	52	127	144,254	750	1,212	— 38.1	1,361,621	2,089,035	131	148	244
South Dakota									1	1		16	14	+ 14.3	90,641	70,258	2	2	3
Tennessee													1			2,269			
Texas	832	41	55	607	5		5	1,545	1,644	1,328	6,787,951	13,807	12,540	+ 10.1	62,207,947	57,525,595	1,239	1,227	1,327
Dist. 1: South Central	71		5	44				120	99	72	378,256	842	614	+ 37.1	2,804,148	1,982,968	33	31	28
Dist. 2: Middle Gulf	26	14	4	35				79	64	66	514,992	617	586	+ 5.3	3,734,922	3,618,643	30	35	38
Dist. 3: Upper Gulf	71	10	5	54			2	142	155	145	900,502	1,320	1,234	+ 7.0	8,890,899	8,339,112	123	116	138
Dist. 4: Lower Gulf-S.W.	33	14	3	52				102	112	134	570,870	1,089	1,380	— 21.1	5,701,395	7,938,689	60	72	100
Dist. 5: East Central	7		1	17				25	26	16	92,044	213	215	— 0.9	807,488	865,136	11	13	11
Dist. 6: Northeast	37	2	6	27				72	53	47	403,165	544	371	+ 46.6	3,195,496	2,225,928	52	60	51
Dist. 7-B: North Central	121		1	166	2		1	291	287	249	839,138	2,213	2,323	— 4.7	7,077,774	7,539,716	127	134	174
Dist. 7-C: West Central	69	1	5	43				118	122	81	623,955	992	1,011	— 1.9	5,141,783	4,960,059	140	120	130
Dist. 8: West	198			44	1			243	268	197	1,344,940	2,194	1,685	+ 30.2	13,041,026	9,718,988	343	338	344
Dist. 9: North	149		5	116	2		2	274	351	269	839,281	3,035	2,730	+ 11.2	9,324,184	9,121,354	240	236	227
Dist. 10: Panhandle	50		20	9				79	107	52	280,808	748	391	+ 91.8	2,488,832	1,215,002	80	72	86
Utah			1	10				11	6	3	40,168	47	58	— 19.0	218,214	324,809	29	23	21
Washington																	1	1	1
West Virginia	10		53	9				72	39	46	226,202	414	466	— 11.2	1,202,484	1,300,913	171	170	215
Wyoming	42	1	3	23				69	87	96	323,495	879	594	+ 48.0	4,632,865	2,968,724	82	89	146
Total United States	2,263	61	289	1,648	38	5	8	4,312	4,421	4,044	17,165,231	38,717	35,915	+ 7.8	156,662,719	144,615,284	4,467	4,439	4,879
Total Western Canada	76		17	57			1	151	259	202	6,117,530	1,538	1,646	— 6.6	6,117,530	6,778,004	121	109	184

Completions Continue High

Three-quarter total assumes a lead of almost 8 percent over last year.

THE HIGH RATE of activity that has characterized this year's drilling campaign since its beginning was continued through September and the resulting completed wells boosted the three-quarters total to a lead of almost 8 percent over last year's. Drilling in the final quarter should easily put the year well ahead of 1953 and establish a new all-time high mark of over 50,000 new wells. That would be the first time in the history of the U. S. industry that 50,000 wells were drilled in a single year.

September's wells totaled 4312 to top the 4044 completed in September of last year and to boost this year's total to 38,717. That amounted to a gain of 7.8 percent over last year's three-quarter total of 35,915 new wells.

Represented in September's wells were 17,165,231 feet, which was about one million feet more than were recorded in September, 1953. It also ran the year's over-all total to 156,662,719 feet, which was an increase of 9.2 percent over last year's 144,615,284 feet. At the current drilling rate, U. S. drillers should accomplish more than 200 million feet of hole this year, and that would be the first time that level was reached. It has been an active year for the industry's drillers.

Average depth of new wells so far this year has been 4046 feet, while a year ago each new well was taken to 4026 feet. This year's average was the second deepest ever recorded. The 1952 average of 4051 feet remains in top spot.

Most of the leading drilling states have contributed their shares to the nation's increased operations this year. Texas, the most active state, increased its completed wells 10 percent over last year's. The No. 2 area, Oklahoma, has seen wells increase better than 11 percent.

Of the top five states, Kansas was alone with a drilling decline. Louisiana and Illinois, Numbers 4 and 5, respectively, raised their operations substantially.

Central Nebraska Has Possibilities

• Oil and gas potentialities of entire sedimentary section can be tested with comparatively shallow, low-cost wells, generally under 4500 feet.

• Less than 100 adequate tests have been drilled in this region comprising some 25,000 square miles.

By PROF. E. C. REED, Director, Nebraska Geological Survey, Lincoln, Neb.

SUCCESSFUL OIL and gas development in the Denver-Julesburg Basin of Western Nebraska, during the past four years, has focused attention on other parts of the state where there is presently no production of significance. This has resulted in a reexamination of the Central Nebraska Basin by both large and small operators during the past few years and extensive leasing, especially in the western part of the Basin. To date comparatively little new exploratory drilling has been done, but increased activity is expected. It is the purpose of this article to discuss the general geologic considerations which may affect the possibilities of developing oil and gas in commercial quantities.

Definition of Basin. Great confusion usually exists when basin names are applied, especially in areas of complex geologic history, because the basin name is applied with different connotations. Being principally concerned with an area where dual or multiple prospective horizons are present, the Central Nebraska Basin will be limited to that portion of Nebraska east of the Cambridge-Chadron arch and west of the Table Rock arch (Nemaha granite ridge), where not only Permian and Pennsylvanian formations are present, but pre-Pennsylvanian sedimentary formations also occur in the subsurface (See Figure 1).

Although the Cambridge-Chadron arch trends northward and northwestward across Nebraska from about Range 26 west (southeastern Redwillow County) at the Kansas line to Range 47 west (northeastern Dawes County) at the South Dakota line, the east flank of this broad structural feature is partly represented by an area where Pennsylvanian sediments rest on the pre-Cambrian igneous or metamorphic rocks and no pre-Pennsylvanian sedimentary formations of Cambrian to Mississippian age occur between the Pennsylvanian and the pre-Cambrian rocks. East of a line through eastern Furnas, western Phelps, eastern Dawson, eastern Custer and western Garfield counties, the Cambrian to Mississippian sediments are present.

Farther to the north this line probably swings northeastward across Holt and eastward across Knox and Cedar counties paralleling the ancient Siouxana uplift, but there has been too little drilling in northeast Nebraska to place this boundary with great accuracy. The southeastern edge of the Central Nebraska Basin is a line northeastward across Pawnee and Johnson counties, and northward through central Otoe, Cass and Sarpy counties. The Central Nebraska Basin comprises more than 25,000 square miles.

It appears that the Central Nebraska Basin is a northward extension of the Salina Basin of Kansas and is not connected with the Williston Basin of western North Dakota so far as the extent of pre-Pennsylvanian sedimentaries is concerned. The distribution of Cambrian to Mississippian rocks indicates a connection between the Forest City Basin of southeastern Nebraska and the Central Nebraska Basin through southwestern Iowa and northwestern Missouri. Therefore the boundary between these two basins is somewhat arbitrarily placed at or near Omaha along the Iowa-Nebraska line.

Geologic History. The study of the records of wells drilled in the Central Nebraska Basin indicates a relatively complex geologic history as indicated by the distribution of pre-Pennsylvanian sedimentary formations (Figure 2). The principal events that may have had a bearing on oil and gas accumulation are summarized below.

1. Invasion of Upper Cambrian and Lower Ordovician seas from southeast encroaching upon Siouxana arch upland; Table Rock and Cambridge arches not present.

2. Table Rock and Cambridge arches broadly upfolded at close of Lower Ordovician (Arbuckle) time and Cambro-Ordovician sediments removed from crestal parts of Table Rock and Cambridge arches.

3. Invasion of Upper Ordovician and Silurian seas from the east overriding the Table Rock arch depositing progressively thinner sediments westward and northwestward.

4. Rejuvenation of Siouxana uplift at close of Silurian time resulting in northwestward truncation of Silurian rocks and overlap by Devonian sediments which thin markedly westward and northwestward as the Cambridge arch is approached.

5. Some uplift, folding and erosion at close of Devonian with invasion of Mississippian sea from east and southeast resulting in overlap of Mississippian sediments westward overriding southern part of Cambridge arch.

6. Extensive folding at close of Mississippian time when the Cambridge arch was broadly upfolded and the Table Rock arch was strongly uplifted with the formation of the Humboldt Fault on its eastern margin. The thick Upper Ordovician to Mississippian rocks were completely removed from the crestal portions of the Table Rock arch at this time and the crestal part of the Cambridge arch was stripped of lesser thicknesses of pre-Pennsylvanian sediments.

7. The Pennsylvanian sea invaded

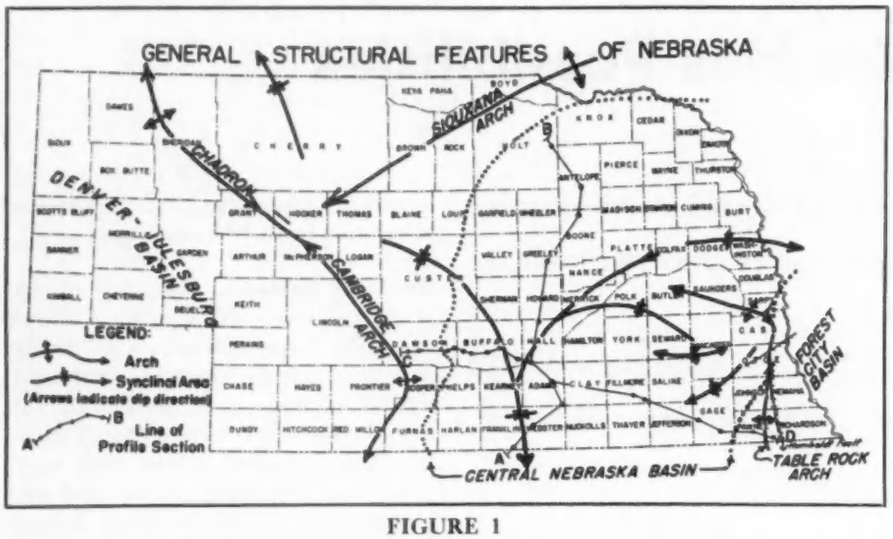


FIGURE 1

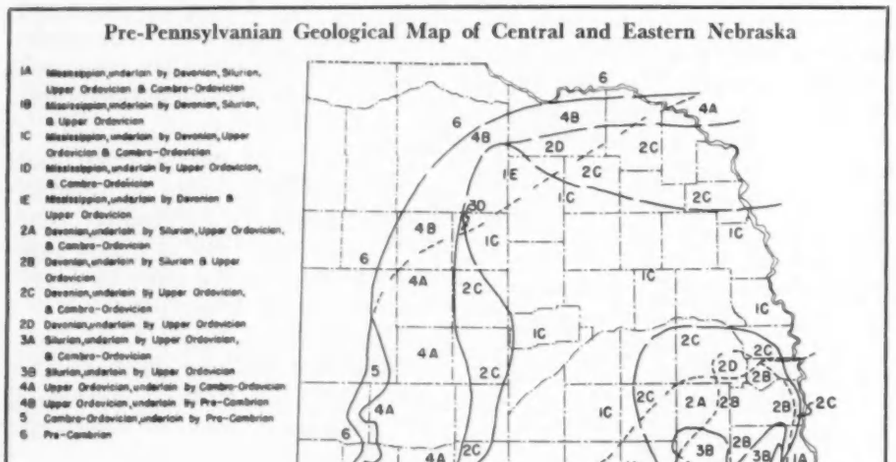

Pre-Pennsylvanian Geological Map of Central and Eastern Nebraska
1A Mississippian, underlain by Devonian, Silurian, Upper Ordovician & Cambro-Ordovician
1B Mississippian, underlain by Devonian, Silurian, & Upper Ordovician
1C Mississippian, underlain by Devonian, Upper Ordovician & Cambro-Ordovician
1D Mississippian, underlain by Upper Ordovician, & Cambro-Ordovician
1E Mississippian, underlain by Devonian & Upper Ordovician
2A Devonian, underlain by Silurian, Upper Ordovician, & Cambro-Ordovician
2B Devonian, underlain by Silurian & Upper Ordovician
2C Devonian, underlain by Upper Ordovician, & Cambro-Ordovician
2D Devonian, underlain by Upper Ordovician
3A Silurian, underlain by Upper Ordovician, & Cambro-Ordovician
3B Silurian, underlain by Upper Ordovician
4A Upper Ordovician, underlain by Cambro-Ordovician
4B Upper Ordovician, underlain by Pre-Cambrian
5 Cambro-Ordovician, underlain by Pre-Cambrian
6 Pre-Cambrian

FIGURE 2

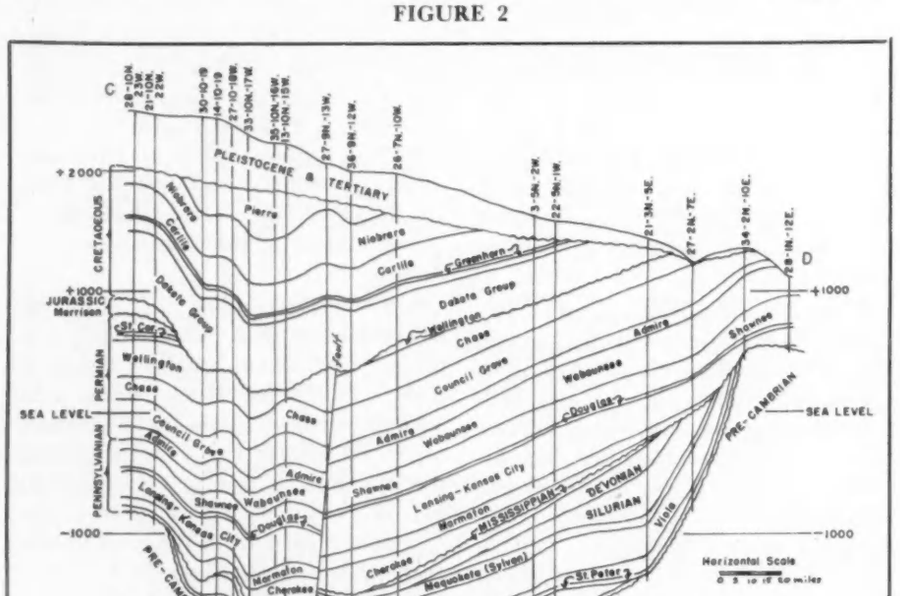


FIGURE 3

the basin from the south and southeast overriding the Cambridge and Table Rock arches and depositing progressively thinner and redder sediments northwestward. Some contemporaneous uplift in connection with the principal arches is indicated by thinning of many subdivisions over the uplifts.

8. Some evidence of rejuvenation of Siouxana arch in early Permian time but as yet inconclusive. Generally no great interruption in sedimentation between Pennsylvanian and Permian.

9. General uplift of area at close of Permian time with no Triassic sediments represented and Jurassic sediments not reaching much east of the west-central part of the state. Siouxana arch actively uplifted for the last time in post-Permian time.

10. Invasion of Cretaceous sea from west with some contemporaneous uplift along Cambridge-Chadron arch.

11. Cambridge-Chadron arch strongly upfolded in post-Cretaceous time followed by extensive erosion in uplifted areas.

12. Continental Tertiary sediments deposited over eroded older sediments. Some eastward to southeastward tilting in post-Tertiary time followed by several glacial advances and retreats in eastern Nebraska.

The present attitude of the rocks in the Central Nebraska Basin is indicated by Figures 3 and 4, north-south and east-west profile sections across the Central Nebraska Basin.

General Nature of Sediments. The Cambro-Lower Ordovician sediments vary in known thickness from more than 400 feet in Burt County and over 350 feet in southeastern Franklin County to zero in the environs of the Table Rock arch and northwestward as the Siouxana and Cambridge arches are approached. A number of wells in the deeper parts of the basin were designed as Arbuckle tests and therefore were only drilled into the upper parts of these rocks. Generally referred to as "Arbuckle" these sediments consist of dolomites with variable and often excellent porosity and permeability. The lower dolomites are usually glauconitic and believed to be Upper Cambrian in age. A basal sand, generally coarse-textured and referred to as the Reagan and LaMotte formations, usually occurs at the base

of the Cambro-Ordovician and tends to thicken northward and northeastward. Locally it is overlapped by the glauconitic dolomites which are believed to represent the Bonneterre of Missouri, at least in part, and are classified as Upper Cambrian. Where the Cambro-Ordovician sediments are more than 150 to 200 feet in thickness, dolomites generally nonglauconitic and believed to be Lower Ordovician in age, are represented, with a comparatively thin sand at the base which is tentatively referred to the Gunter of Missouri. Oil shows in the Cambro-Ordovician have not been noted in wells drilled to date but these rocks include a number of zones which would serve admirably as reservoirs for oil accumulation under the proper conditions.

The Upper (and Middle) Ordovician is represented by a maximum thickness of more than 600 feet in parts of Lancaster, Saunders, Cass and Otoe Counties thinning rapidly to zero southeastward toward the Table Rock arch as its different formations are lost by truncation. These sediments reach farther northward than the Cambro-Ordovician but are slightly less extensive westward. They consist of a lower division of green shales with thin interbedded dolomites which are believed to correlate with the Simpson and vary from 50 feet westward to more than 100 feet eastward and northeastward where the St. Peter sandstone appears at the base in thicknesses of 25 to 60 feet or more, generally thickening to the northeast. Next above the "Simpson" green shales are 150 to 300 feet or more of chert-bearing dolomites classified as Viola. The top division of the Upper Ordovician, classified as Maquoketa or Sylvan, is usually from 50 to 120 feet in thickness although it is locally thinner or absent. In most of the basin it consists of light gray, very granular dolomites with only thin interbeds of shale. The Viola and St. Peter both are sufficiently porous and permeable to be good reservoir rocks.

The Silurian is represented by dolomites which are usually chert-bearing and are restricted to the southeast part of the basin. Thicknesses of more than 500 feet occur in the western part of the Forest City basin and more than 400 feet have been drilled in Gage County, west of the Table Rock arch. There is progressive thinning to zero northwestward and as the Table Rock arch is approached.

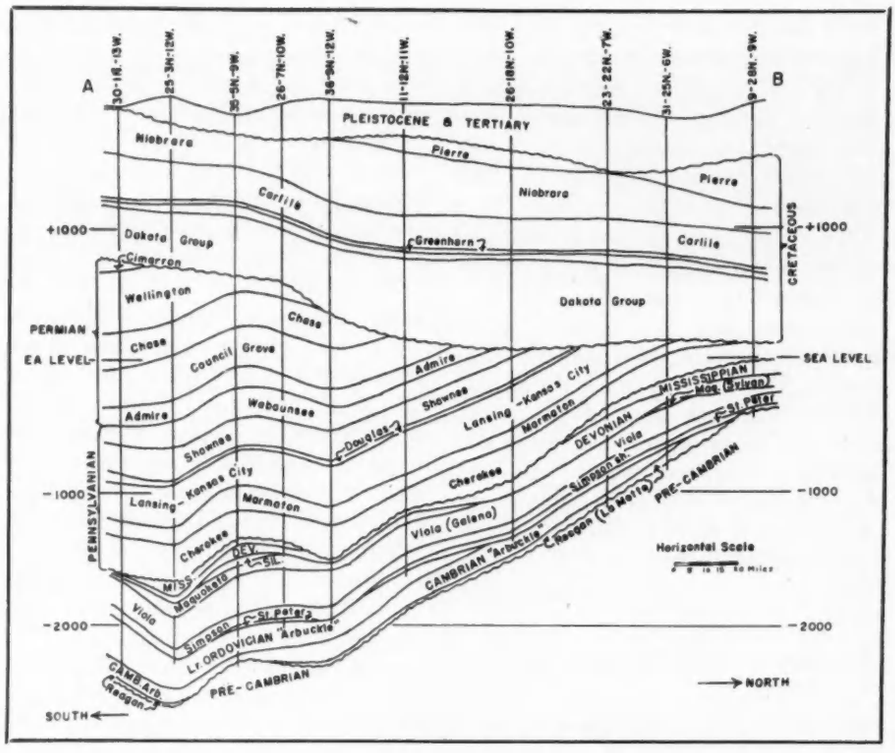


FIGURE 4

The Devonian consists of interbedded dolomites of variable texture with some interbedded dense limestone and green shales and its base is usually marked by a zone of sand-embedded dolomite or dolomitic sand. More than 500 feet of Devonian are represented in eastern Douglas and Sarpy counties thinning to less than 100 feet in the southwest part of the basin. They generally overlap on Viola westward and northwestward and are less extensive than the Upper Ordovician in those directions. The Devonian has been completely removed from the higher parts of the Table Rock arch and the crestal parts of the structurally high in southern Lancaster County (See Figures 1 and 2). Some of the dolomites included have good porosity and permeability.

Although Mississippian rocks are distributed extensively toward the western and northwestern parts of the basin they are comparatively thin except in Burt County where they reach a thickness of 300 feet or more. They have been eroded from an extensive area near and over the Table Rock arch. The Chattanooga shale, which reaches a thickness of more than 200 feet in the deeper parts of the Forest City basin, is generally absent although about 50 feet are present in Burt County. Most of the Mississippian is represented by a limestone which is generally oolitic westward and tends to be very finely crystalline and dense southeastward in the basin. This limestone is believed to correlate with the Gilmore City although it may also include some older Mississippian rocks. In the deeper parts of the Central Nebraska Basin, where more than 100 feet of Mississippian are represented, the upper part consists of cherty dolomites, probably of Osage age.

Lower Pennsylvanian sediments, absent over the higher parts of the Cambridge-Chadron and Table Rock arch, are comparatively thin in the basin and include some coarse basal sands westward which seem to have been derived from the higher parts of the Cambridge-Chadron arch. The Kansas City-Lansing limestones are well developed in much of the basin but thin over the higher arches. "Pinpoint porosity" is common in the thicker limes and some of the oolitic horizons have good "porosity." Most of the oil shows in the basin to date have been noted in the Kansas City-Lansing limestones and three small

wells are now producing from this horizon in Harlan County.

The Permian sediments show a marked tendency to become redder in a northwest direction and evaporites tend to replace the dolomites and limestones.

The Cretaceous rocks are thickest in the west-northwestward parts of the basin where more than 1500 feet are present and thin to zero in the southeast part of the basin by truncation. There is also marked thinning in the northeast part of the basin. The Dakota Group of sandstones and shales, in the lower part of the Cretaceous, are in part correlative to the productive sands of the Denver-Julesburg basin but seem to be progressively less marine and more continental in nature eastward.

Tertiary and Pleistocene Mantle. The Cretaceous and older rocks in the Central Nebraska Basin are generally mantled by from 200 to more than 700 feet of continental Tertiary and Pleistocene materials which do not reflect the structure of the underlying bedrock. Some Cretaceous and older bedrock is exposed along the valley sides of the Republican, Missouri and Big Blue valleys but these areas are too limited to permit extensive structural mapping by surface methods.

Therefore, structural control can only be secured by core-drilling or by geophysical methods. Core-drilling seems to be most effective in the eastern part of the Basin and seismograph most effective in the western part of the basin. Magnetometer and gravity meter investigations may be useful for general reconnaissance but have not given satisfactory results in connection with detailed structural conditions, so far as known by the writer.

Depth to Pre-Cambrian Rocks. The depth to pre-Cambrian rocks varies from a maximum of about 4500 feet, in the deepest part of the Basin to less than 2000 feet in the northeastern part and in the environs of the Table Rock arch. The shallowest pre-Cambrian occurs in the higher parts of the Table Rock arch at depths of about 500 feet while the pre-Cambrian is reached at about 3500 feet over the Cambridge arch. In much of the basin Arbuckle rocks may be reached at about 4000 feet or less.

The lithology of the pre-Cambrian is variable, consisting of granite in some cases, quartzite in other cases, as well as several different kinds of metamorphic rocks. Occasionally red, fine-grained sandstones, that do not appear to be highly metamorphosed, are drilled in the pre-Cambrian and are classified as pre-Cambrian because of their stratigraphic position below the oldest Cambro-Ordovician sediments. The pre-Cambrian is not regarded as a probable source of oil or gas except under unusual conditions where its upper surface may have developed secondary porosity due to weathering and good source rocks occur above. Therefore all wells reaching the upper part of the pre-Cambrian are regarded as complete tests. Tests reaching the upper part of the Cambro-Ordovician "Arbuckle" are also regarded as relatively complete tests as any Cambro-Ordovician oil is most likely to be found in the uppermost permeable part.

Groundwater Quality in Bedrock Formations. Water samples that have been collected and analyzed in the Central Nebraska Basin indicate relatively low mineralization except for the Pennsylvanian and Permian where higher mineralizations are common. This is regarded by some as unfavorable so far as oil and gas possibilities are concerned. However, it should be noted that the water occurring with the oil in the Devonian of the Forest City Basin is also of low mineralization.

Moreover, wells drilled on closed structures in the Basin may be expected to yield much more highly mineralized water. For example, the St. Peter sandstone water in the Forest City Basin usually contains less than 2000 parts per million of total dissolved solids yet it is known to yield water of 30,000 parts per million in the higher, closed parts of the Dawson oil field structure.

Justification for Additional Drilling. Exploratory drilling in the Central Nebraska Basin to date has resulted in little success but it should be remembered that this is an area of 25,000 square miles or more and less than 100 tests have been made which can be regarded as comparatively complete tests in the region where pre-Pennsylvanian rocks are present.

The entire sedimentary section can be tested with comparatively shallow wells generally under 4500 feet in depth. Therefore deep and expensive drilling is not involved. Unusual drilling conditions do not exist which make drilling operations difficult when ordinary care is used and adequate drilling mud is employed.

Although the Dakota Group sandstones are not regarded as a highly favorable oil or gas horizon in this basin, there are a number of lower horizons where conditions seem to be favorable. Some of the limestones in the Kansas City-Lansing Groups of the Pennsylvanian may be regarded as good prospective horizons where adequate porosity and permeability are present under proper structural conditions. Some of the Devonian dolomites are adequate reservoirs but probably less favorable than in the Forest City Basin because of the general relationships. The Viola dolomites generally have good permeability and porosity and the underlying Simpson green shales or overlying Pennsylvanian shales may be favorable oil source rock. The St. Peter sandstone, at the base of the Simpson, is often an excellent reservoir rock. Several different horizons in the Cambro-Ordovician are good reservoirs and may contain oil in commercial quantities where closely associated with satisfactory oil source rock.

The varied sedimentary and structural history of the basin is certainly indicative of possibilities that good traps for oil or gas accumulation may have been formed and preserved as such in some parts of the basin. The presence of several major unconformities, i.e. at the base of the Cretaceous, at the base of the Pennsylvanian and at the top of the Cambro-Ordovician introduces other speculative possibilities. Moreover, locations which may adequately test Pennsylvanian structure may be poorly located as pre-Pennsylvanian tests and Cretaceous structure may be quite different than Pennsylvanian and older structures.

Although the Central Nebraska Basin may not become a large oil producing area it is certain that the region presents a number of interesting possibilities that can be tested at comparatively small per well expense. Therefore it seems that further exploration is completely justified and may result in some important new discoveries. —**The End**

AVAILABLE JOHNSTON by AL CAPP

WHO IS YO', AN' WHAR IS YO' GOIN'?
AH IS AVAILABLE, AN' HE IS ACCURATE JOHNSTON—AN' WE IS GOIN' T' TEST A OIL WELL!!
SMACK OUT HERE, IN TH' OCEAN?
YAS'M!!—US JOHNSTONS TEST OIL WELLS, ANY-WHAR, ANY TIME—AN' FAST!!
COME BACK!! TELL ME MORE!!
CAIN'T, MA'M!!—WHEN WE GO OUT T' TEST A WELL, WE CUTS LOST DOWN-TIME TO A MINNY-MUM!!

C-548

Copr. Capp Enterprises 1954

JOHNSTON TESTERS

first in drill stem testing

HOUSTON, TEXAS

LOS ANGELES, CALIF. • CALGARY, CAN.

FORMATION AND CASING TESTING — JOHNSTON

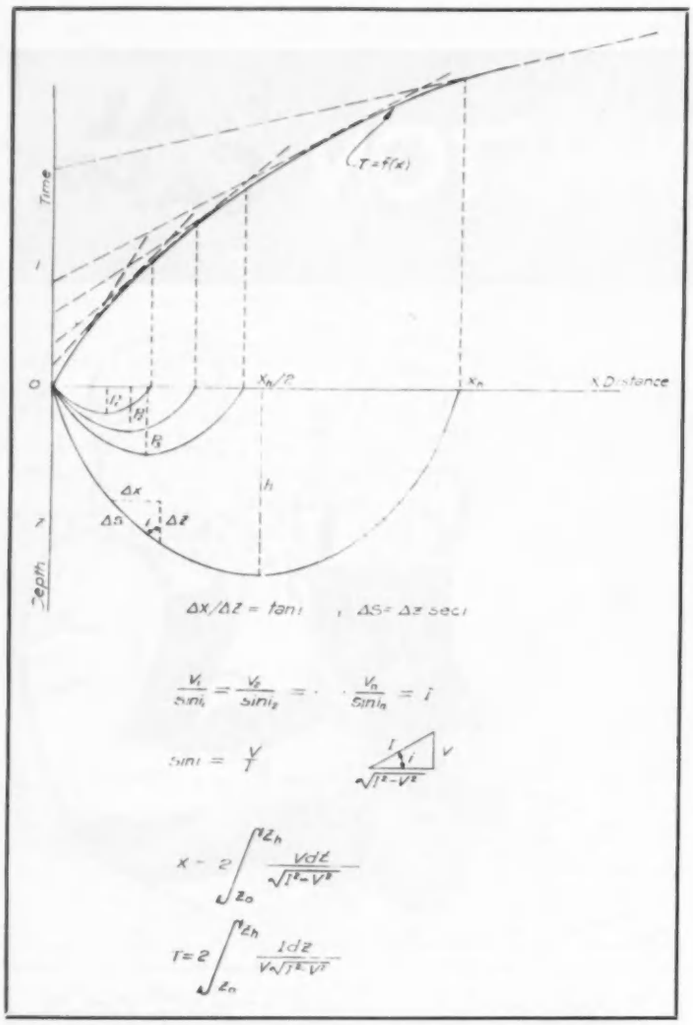

Time
Depth
T=f(x)
Distance
$\Delta x/\Delta z = \tan i$; $\Delta S = \Delta z \sec i$
$\frac{V_1}{\sin i_1} = \frac{V_2}{\sin i_2} = \cdots \frac{V_n}{\sin i_n} = I$
$\sin i = \frac{V}{I}$
$x = 2\int_{z_0}^{z_h} \frac{V dz}{\sqrt{I^2 - V^2}}$
$T = 2\int_{z_0}^{z_h} \frac{I dz}{V\sqrt{I^2 - V^2}}$

Fig. 1—General equations which apply to any curved path theory, regardless of the assumption describing the velocity-depth distribution.

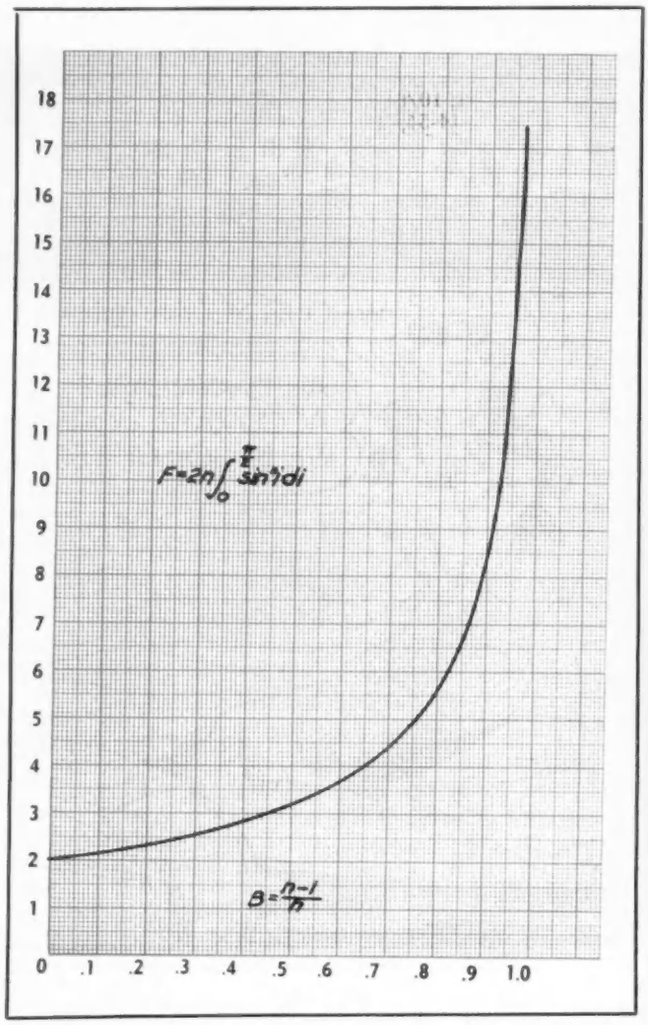


Fig. 2—Curve showing the relation between "F" and "B" is indicated here.

Computing Weathering Corrections For Seismograph Shooting

Velocities of rocks near surface are variable, and corrections must be made for variations through this "weathered" layer.

By E. J. HANDLEY, Executive Vice President,
Midwestern Geophysical Laboratory, Tulsa

IT IS COMMONLY recognized in geophysical surveying that weathering computations must be made to correct for the errors in observed travel times which are due to local variations in the surface and near-surface rocks, and which variations are not related to subsurface structure. The surface and near-surface rocks characteristically exhibit variable velocities because of rock differences due to the effects of weathering, differences in compactness and consolidation, and local variations in sedimentology and lithology.

Rock types, and therefore rock velocities, may show extreme variations both laterally and vertically from any given point in almost any area. Present streams and ancestral streams often create conditions exhibiting abrupt changes in near-surface velocities. It is generally possible to drill through the low-velocity-layer, bottoming the hole in geological beds that are more or less homogenous and have reasonably constant velocities, both vertically and horizontally, or if the velocities do change, they change at a rate sufficiently slow that they do not be-

MODERN SCHEDULES DEMAND—POWER...

FLUID POWER

DUDCO DIVISION
Hazel Park, Mich.
Dual-Vane Hydraulic Pumps, 3 to 120 gpm; Fluid Motors, 7 to 140 hp; 2000 psi operation. Piston-Type Pumps for 5000 psi.

HYDRECO DIVISION
Cleveland, Ohio
Gear-Type Hydraulic Pumps, 3 to 120 gpm; Fluid Motors, 3 to 52 hp; Cylinders; Control and Auxiliary Valves; 1500 psi.

WATERTOWN DIVISION
Watertown, N. Y.
Railroad air brake valves for freight and passenger equipment, STRATOPOWER Hydraulic Pumps for Aircraft, to 3000 psi.

KINNEY MANUFACTURING DIVISION
Boston, Mass.
Rotating Plunger and Heliquad Liquid Handling Pumps, to 3000 gpm. Vacuum Pumps, 0.2 micron, evacuate 1800 cfm.

AURORA PUMP DIVISION
Aurora, Ill.
Liquid Handling Pumps, Centrifugals, 4000 gpm, 500 ft. heads. Turbine-Types, 7000 gpm. Condensate Return Units.

Vehicles that haul 75 ton loads... Shovels that handle 16 yards and more at a single bite... these are but two of the many juggernauts that move mountains or mole hills... that give industry *higher production at lower cost*. And the key to velvet-smooth control of all this harnessed energy is Fluid Power!

Mine, Construction, Marine, Oil Field, Farm and Materials Handling Equipment attain ever-increasing productivity through the rugged dependability of Fluid Power. Machine Tools, Presses, Paper Machinery, Petro-chemical and other processing equipment achieve greater automation plus micrometric precision through Fluid Power.

There are three divisions of The New York Air Brake Company which concentrate on the development of advanced design hydraulic equipment for this Fluid Power. Thus, from a single source, industry may have the ideal component for the specific function. . . . Gear, Dual-Vane and Piston Pumps, embracing a full range of capacities and pressures to 5000 psi, and Motors, Control Valves and Cylinders to develop complete hydraulic circuits.

In addition to Fluid Power, industry finds the answers to its liquid handling problems in Aurora and Kinney Pumps. "Any material that can be pushed through a pipe" . . . from gasoline and alcohol to tars, sludges, slurries and other heavy semi-solids ...and the less dramatic tasks of sump, deep well, boiler feed, and household needs are all dependably handled by these famous pumps.

Write today for literature containing hundreds of ideas for you to improve your product, increase production and lower costs.

THE NEW YORK AIR BRAKE COMPANY

230 PARK AVENUE NEW YORK 17, N. Y.

come a troublesome source of error in making relative dip and depth computations.

However, in some areas it is impractical to drill holes to such reasonably "constant velocity" rock-layers, either because such layers are too deep or perhaps because drilling conditions are too difficult. Since velocities change most drastically quite near the surface, layers may therefore exist below practical shot-hole drilling depth, wherein either the velocity varies or the thickness of the low velocity layer varies. If it is impractical to drill through the low velocity layers and make weathering computations using measured up-hole times, then the thickness of the low velocity layers must be computed. Since only times and distances are observed, these data must be used and generally satisfactory weathering corrections can be computed for the various layers by means of the first-arrival times obtained at the various detector positions.

If the first arrival time-distance curve consists of segments of straight lines, it is known from elementary theory that the paths have penetrated corresponding layers having constant velocities, which velocities are equal to the respective reciprocal slopes of the various straight line segments of the time-distance curve. When the time-distance data, therefore, appears to be best expressed by means of segments of straight lines, we can assume that the rock layers have more or less uniform geological properties with constant velocities and the various depths are computed from the intercepts and slopes obtained from the time-distance curve.

In some areas, the first arrival time-distance data will fall on a uniformly varying curve which cannot readily be approximated by a series of straight line segments, and which curve exhibits a uniformly decreasing slope. This is tantamount to saying that the near-surface rocks are exhibiting a uniformly increasing velocity and cannot be assumed to be in layers of measurable thicknesses. Such a condition can occur where glacial fill or thick sand mantles occur. In fact, such a condition can exist wherever "layer geology" is not present. If the first arrival time-distance data falls on a smooth curve, then the assumption on which the simple theory is based no longer holds, and depths should not be computed based on a multiple layer method of intercepts and slopes. If the velocity uniformly increases with depth, the travel paths are segments of curves rather than a combination of straight lines.

One may assume various mathematical equations relating time and distance and arbitrarily choose constants for such equations to decide which functions best describe the observed time-distance data. From the nature of the data it appears that many time-distance curves could be described by an equation in which time increases as an increasing function of distance. If the equation for the time-distance curve is known, it is then theoretically possible to compute the equivalent vertical time for any given depth of penetration.

On Figure 1 are shown the general equations which apply to any curve path theory regardless of the assumption describing the velocity-depth distribution. It may be observed in passing that the general equations describing time and distance in terms of velocities and depths are integrals involving the square root of polynominals. For many velocity-depth assumptions these equations result in elliptical and hyperbolic integrals which are indefinite and therefore result in rather complex mathematics.

From fundamental considerations it is apparent that the horizontal distance at the surface associated with a given travel-time is a function of velocity and depth and that the travel-time is similarly a function of velocity and depth. Therefore, if one assumes a relationship between velocity and depth, it is possible to solve the general equations describing time and distance in terms of one variable. Normally, therefore, one first assumes an equation describing how the velocity varies with depth and then proceeds to develop the curved path theory based on that velocity assumption. However, if an equation has been assumed from an empirical study of the data which will adequately describe observed time-distance curves, then it is possible to compute penetrations directly from the time-distance data without using the associated assumption describing the increase of velocity with depth. It is only necessary that the time-distance curve be smooth and that the velocity continuously increase with depth. The Herglotz-Bateman equation has been so used by tectonic seismologists for many years. A form of this equation was utilized in applied seismology by Ewing and Leet many years ago.[1]

The general curved path equations yielding a value for the penetration based on the assumption that the time-distance curve is a root or exponent function was solved by E. V. McCollum in the early 30's.[2] If the time-distance equation is of the form in which time is equal to a constant times a root of the distance, it can be shown that the instantaneous velocity is of the same form and similarly is equal to a constant times a root of the depth. It is well known throughout the geophysical profession that Ernest Blondeau, of G.R.C., developed a complete theory for weathering computations in which the near-surface velocities were assumed to increase with depth as described by this type of equation.

Equations 1 to 6 are general equations to be used in developing any curved path theory.

1. $X = f(I, V_z, Z)$
2. $T = f(I, V_z, Z)$
3. $V_z = f(Z)$
4. $I = \dfrac{dX}{dT} = V_h$
5. $X = 2\displaystyle\int_{\Sigma_o}^{\Sigma_h} \tan i \, dZ$
6. $T = 2\displaystyle\int_{\Sigma_o}^{\Sigma_h} \frac{\sec i}{V_z} \, dZ$

Equation 7 is the Herglotz-Bateman equation used by earthquake seismologists for computing penetrations.

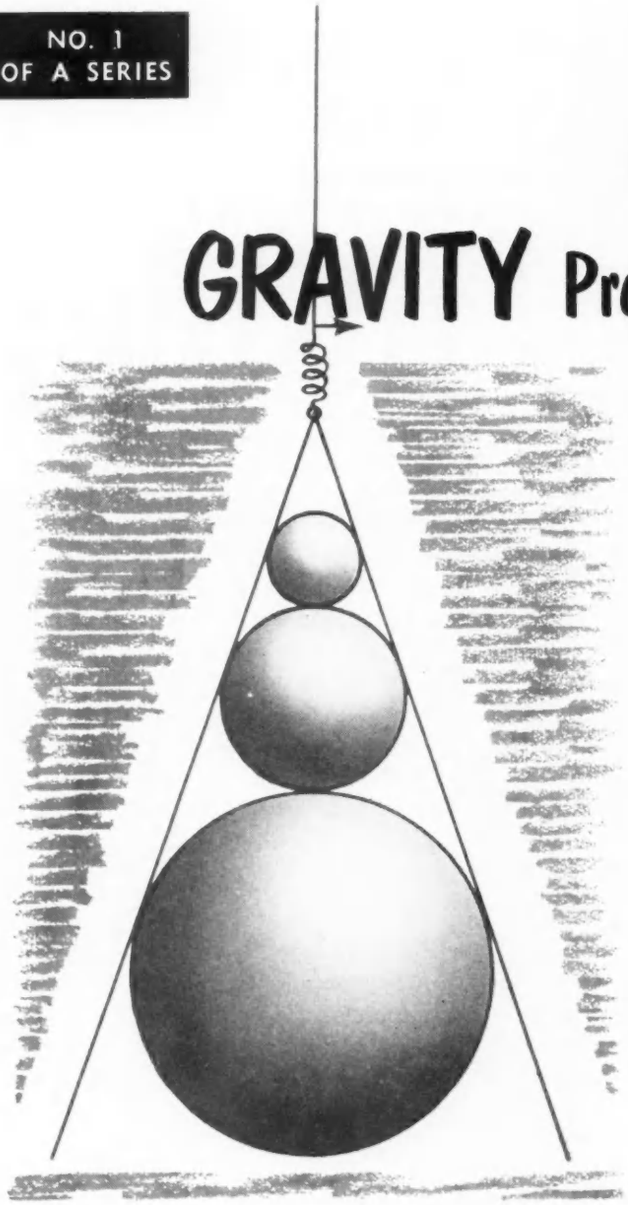
7. $h = \dfrac{1}{\pi}\displaystyle\int_o^{X_h} \cosh^{-1} \frac{T'(X)}{T'(X_h)} \, dX = \frac{1}{\pi}\int_o^{X_h} \cosh^{-1} IT'(X) \, dX$

Equation 8 is the time-distance equation referred to above and which, with the proper choice of constants, will empirically describe many actual conditions to the extent that a curve computed from this equation will rather closely satisfy observed first arrival time-distance data.

8. $T = kX^B$

NO. 1
OF A SERIES

Basic Fundamentals of GRAVITY Prospecting for Petroleum



These spheres have equal gravitational attraction at the apex of the cone.

The gravity method of petroleum prospecting consists in measuring differences in the force of attraction between a small mass in the gravimeter and the earth.

All material around the instrument contributes some part of the force, each particle according to its' mass and position. This force is directly proportional to the density and to the dimension of the particle, and inversely proportional to the square of its distance from the meter. The force of gravity also varies with the angular position of the contributing mass, with respect to the plumb-line at the gravimeter.

Doubling the mass particle doubles the force of attraction; doubling the distance reduces the attraction by four; and a particle directly below the instrument contributes more force than one offside.

The observed differences in gravity are very, very small quantities — nevertheless, they are measurable with high accuracy by the extremely sensitive spring-balance gravimeters in common use.

Gravity differences are due to a number of factors such as those of latitude, elevation, topography and subsurface geology. All not due to geology can be computed and removed from the observed gravity data. Those remaining, known as the geologic anomalies, provide clues to the nature of the earth's crust.

Since this crust is made up of rocks of different densities and positions, the geologic gravity-anomaly is a very useful tool for predicting structural relationships.

SSC offers gravity surveys to its clients as part of a complete exploration service. Its gravity division, using effective instrumentation, is staffed with competent and experienced personnel, and is supervised to the end that;

Field operations must be conducted to SSC's high standards, and —

data is prepared by sound analytical methods*, and interpreted by techniques based on the logical correlation of gravity data with geology.

**SSC's electronic computing facilities are available for gravity analysis*

SEISMIC SURVEYS — GRAVITY SURVEYS — PILOT CREWS — LORAC — VELOCITY LOGGING

Seismograph Service Corporation

TULSA, OKLAHOMA, U.S.A.

WORLD-WIDE EXPERIENCE

Equation 9 is the first derivative of equation 8 and is used in solving the general equation 7. It can be shown that if time and distance are described by equation 8, then the velocity depth distribution is described by equation 10.

$$9.\quad T'(X) = \frac{dT}{dX} = kBX^{B-1}$$

$$10.\quad V_z = cZ^{\frac{1}{n}}$$

The exponents of distance and depth are related as shown by equation 11.

$$11.\quad n = \frac{1}{1-B} \text{ or } B = \frac{n-1}{n}$$

At this point we should observe that if we take the logarithm of both sides of equation 8, we obtain equation 12.

$$12.\quad \log T = B \log X + \log K$$

Equation 12 is the general equation for a straight line drawn on log-log paper, and we should recapitulate that if the time-distance equation is that shown by equation 8, then the velocity depth equation is that shown by equation 10. Since equation 12 is the general equation for a straight line, it follows that equation 10 is the only velocity-depth distribution that can be assumed which will result in a linear time-distance relation as described by equation 12. Since equation 10 mathmetically indicates a velocity value of zero at the surface, when Z is O. Banta developed a curved path theory utilizing equation 10 with a constant being added to the depth and this sum being increased by the fractional exponent.[3] From equation 12, however, it can be seen that Banta's equations are practically useful only when this constant is equal to O, thus reverting to equation 10, which was used by Blondeau.

Using equation 10, equation 5 can be solved as shown in equation 13.

$$13.\quad X = h \cdot 2n \int_o^{\frac{\pi}{2}} \sin^n i \, di$$

The quantity as indicated in equation 14 is a definite integral and is a constant for any set of conditions described by a given value of "n".

$$14.\quad F = 2n \int_o^{\frac{\pi}{2}} \sin^n i \, di$$

Therefore, it is seen from equation 15 that the ratio of horizontal travel distance to vertical penetration depth is a constant for any given value of the earth constant "n".

$$15.\quad \frac{X_h}{Z_h} = F$$

In a similar manner utilizing equation 10, equation 6 may be solved describing the travel time as indicated in equation 16.

$$16.\quad T = \frac{h}{C}^{\frac{n-1}{n}} \cdot 2n \int_o^{\frac{\pi}{2}} \sin^{n-2} i \, di = \frac{h^B}{BC} \cdot F$$

The vertical penetration time can be obtained directly from its fundamental definition utilizing equation 10 as shown in equation 17.

$$17.\quad t_h = \int_o^h \frac{dZ}{V_z} = \int_o^h \frac{dZ}{\frac{1}{n}} = \frac{h^B}{BC}$$

It appears, therefore, that the ratio of total travel time to vertical penetration time is equal to the same constant relating horizontal distance to penetration depth described above.

$$18.\quad \frac{T}{t_h} = F$$

Therefore, for any predetermined peel-off depth, the corresponding horizontal travel time can be readily determined by multiplying the peel-off depth by the proper constant "F". The travel time associated with this horizontal distance can be read directly from the time-distance curve. If the travel time is in turn divided by this constant "F" one obtains the vertical penetration time for the predetermined peel-off depth.

$$19.\quad X_h = F\,Z_h, \quad T_h = f(X_h), \; t_h = \frac{T_h}{F}$$

It is evident from equation 20 that "F" is a function of "n"; as shown in equation 11 and 21, "B" is also a function of "n"; therefore, it is evident that "F" is a function of "B". Since "B" is the slope of the time-distance data, when plotted on log-log paper, it is readily obtainable and for each value of "B" a value of "F" is determined and can be read from a table or chart.

$$20.\quad F = 2n \int_o^{\frac{\pi}{2}} \sin^n i \, di = f(n)$$

$$21.\quad B = \frac{n-1}{n} = f(n)$$

$$22.\quad F = f(B)$$

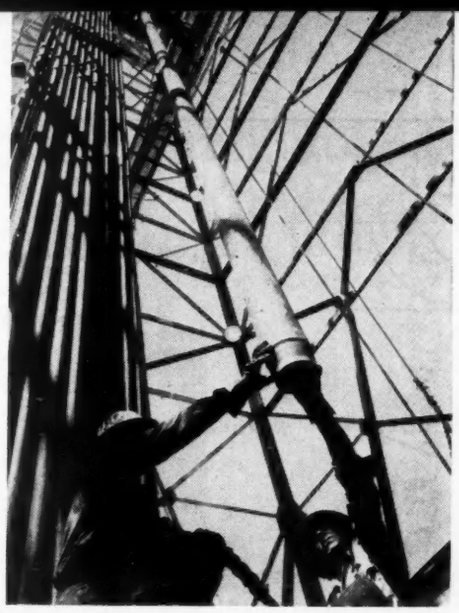
The solution of the definite integral "F", as shown in equation 14, is given by Peirce as shown in equation 23 and 23-A, or 23-B.[4]

$$23.\quad F = \frac{2n \cdot 1 \cdot 3 \cdot 5 \cdot 7 \, (n-1)}{2 \cdot 4 \cdot 6 \ldots\ldots (n)} \pi/2, \text{ if n is an even integer}$$

$$23\text{-A}.\quad F = \frac{2n \cdot 2 \cdot 4 \cdot 6 \ldots\ldots (n-1)}{1 \cdot 3 \cdot 5 \cdot 7 \ldots\ldots (n)}, \text{ if n is an odd integer}$$

$$23\text{-B}.\quad F = n \cdot \sqrt{\pi} \cdot \frac{\Gamma\left(\frac{n+1}{2}\right)}{\Gamma\left(\frac{n}{2}+1\right)}$$

, for any value of n greater than — 1



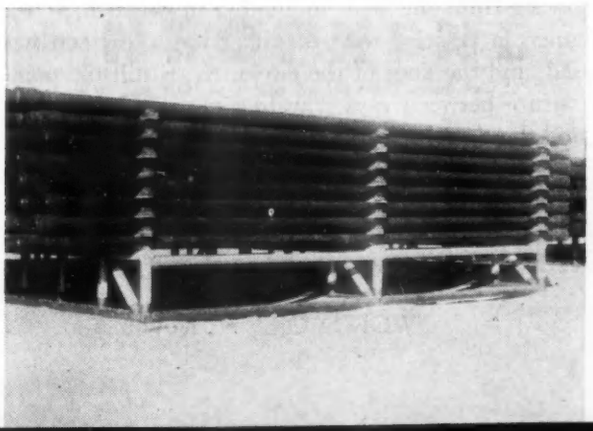
quality

CASING

Grade J-55 55,000 PSI minimum yield strength

Grade N-80 80,000 PSI minimum yield strength

Grade P-110 110,000 PSI minimum yield strength



SPANG EXTREME LINE CASING IS:

PRECISION-MANUFACTURED—Spang Casing has the mechanical and metallurgical properties to withstand the high tensile loading, and to resist the extreme pressures found in present-day deep drilling.

STREAMLINED—Interior and exterior contours provide for maximum running efficiency. There are no shoulders to hang-up on hole projections, or to scrape mud seal from the walls of the hole. The integral joint reduces the number of threaded connections by one-half.

EASY TO HANDLE—Very easy to stab, *cannot* be cross threaded, positive shoulder contact engagement prevents overtonging. Only 5 to 7 turns with spinning line and less than one turn with the tongs are needed when running. Spang Extreme Line Casing can be salvaged and re-run repeatedly.

100% LEAK-RESISTANT—This positive resistance to leakage is of primary importance in the choice of high strength casing for deep, high pressure wells. The rugged integral joints of Spang Extreme Line Casing are your assurance of complete leakage resistance under the most severe and variable conditions you can encounter.

Specify the famous Spang Family of tubular products for quality that pays off in the well. Spang Extreme Line Casing is a member of this family which includes:

Spangweld Drill Pipe
Spang Double Seal Shrink Thread Drill Pipe
Spangseal Tubing
Spang Extreme Line Tubing
API Casing and Tubing

To increase corrosion resistance, a phenolic plastic coating can be applied at the mill on all Spang Tubing and Drill Pipe. Ask the National Supply Representative about this Spang service.

For detailed information on how Spang Extreme Line Casing can pay off in the well for you, call the nearest Division Tubular Office listed at left or write Pittsburgh.

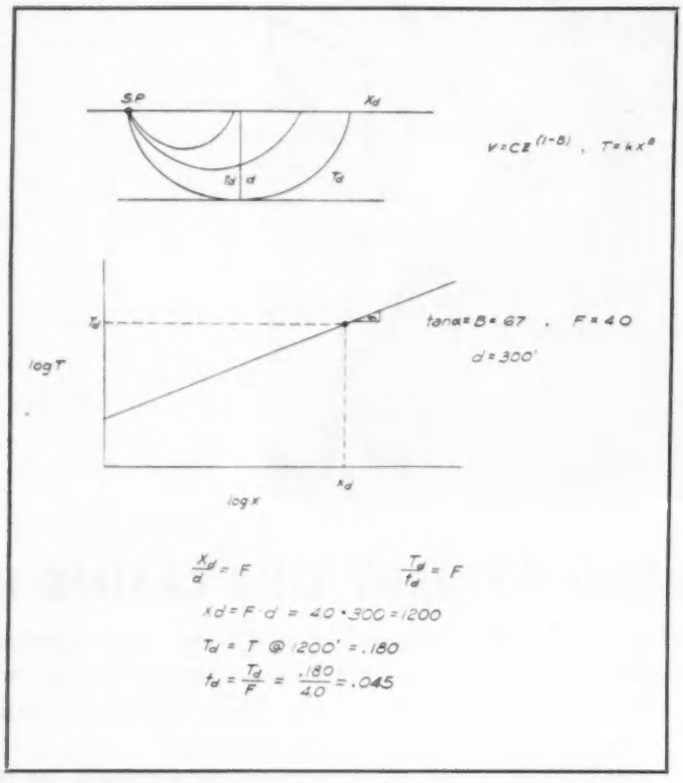


Fig. 3—Computing steps required for the simple, single zone conditions.

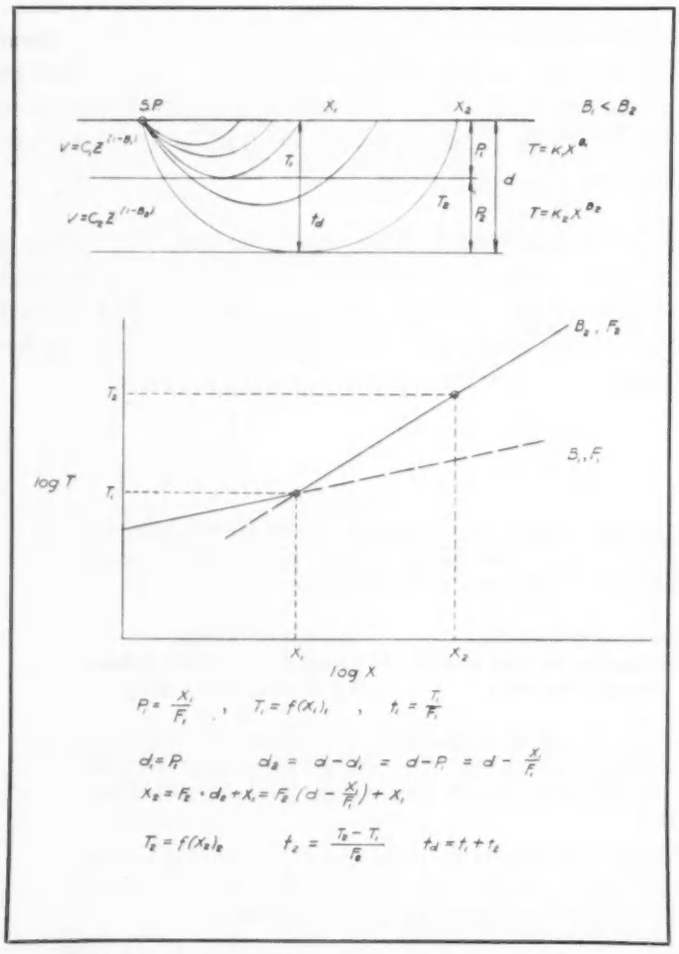


Fig. 4—Computing steps for a normal two-zone condition as set forth in Case 1.

A curve showing the relation between "F" and "B" is indicated in Figure 2.

Since velocities increase more rapidly quite near the surface, it is possible that some depth below the surface the velocity would continue to increase but would do so at a different rate. In which case, one could have a fairly well defined boundary between rock layers, each layer of which however would exhibit a continuously increasing velocity but increasing at different rates. In such areas the first arrival time-distance data would be a series of straight lines on log-log paper rather than one straight line and approximate value for the total penetration can be computed as a summation of penetration times to each layer, by an empirical application of the basic equations 15 and 18. These cases, however, must be solved by an extrapolation of the theory beyond the assumptions originally assumed in the theory's development. Such additional cases, therefore, in which two or more layers are observed, each exhibiting increasing velocities, are of practical importance but are not completely covered by the theory as described in this paper.

The computing steps required for the simple, single zone conditions are outlined on Figure 3.

It is frequently found that the time-distance data, when plotted on log-log paper, are segments of two straight lines, with the deeper segment having the greater slope. This is the normal two-zone condition, and the computing steps are indicated on Figure 4.

Normal Two-Zone Condition

I.

In passing from one layer to another in which $B_1 < B_2$, the change in velocity with depth in the lower layer has decreased, and the knee of the curve, X_1, is the point of departure between the rays travelling in layer 1 and layer 2. The penetration, P_1, is therefore computed from the distance for the extreme path, X_1. The penetration time can be computed from the extreme travel time T_1, which is the coordinate with X_1. The penetration for the second layer, P_2, is obtained by subtracting P_1 from the peel-off depth, d. The equivalent horizontal travel for this amount of penetration is obtained by multiplying P_2 by F_2. The total horizontal travel distance, X_2, for a peel-off depth of d, is obtained by adding the increment obtained above to X_1. The travel time for this peel-off depth, T_2, is read as the coordinate with X_2. The penetration time for the second layer is the difference in the travel paths divided by F_2. The total penetration time is the sum of the times for the two layers.

II.

In passing from one layer to another in which $B_1 > B_2$, the change in velocity with depth in the lower bed has increased, and the knee of the curve, X_1, is still the point of departure between rays traveling entirely in the first layer and those "penetrating" into the second layer. However, rays travelling entirely in layer 1 will continue to be recorded, as secondary arrivals, beyond the distance X_1. Therefore the extreme path in layer 1 emerges at a distance X_{p1}, and the second arrival time T_{p1}, is the co-

"Neoprene stabilizers give us straighter hole—we've used only 3 in 13,000 ft. of drilling!"

— says E. "Butch" Dodson, Tool Pusher, Big West Drilling Co. of Midland, Texas

Courtesy Drilco Oil Tools, Inc., Midland, Texas

"DOWN in the hole, rubber parts really take a beating, with rock, oily mud, and high temperatures and pressures ganging up on them. But our DRILCO neoprene stabilizers sure can stand it! They help make straight hole faster and have cut our crooked-hole problems 'way down.

"Take the hole we're now working on in the Headlee field, near Odessa. We've reached 13,000 ft. in 79 days' drilling, and we've had to replace stabilizers only twice. Thanks to them, we can run 40,000 lbs. on the bit and are only 2 degrees off center at our present depth. No doubt about it—DRILCO neoprene stabilizers have what it takes for accurate drilling, day after day."

Like Big West, many other drilling firms have found neoprene products dependable under rugged service conditions. So whether you're buying stabilizers, drill pipe protectors, piston rubbers, or packers . . . be sure to specify NEOPRENE.

Horace Chambers, driller, looks over stabilizer coming out of hole.

NEOPRENE STABILIZER fits freely around drill collar—enables operator to keep drill centered so that more weight can be put on it. Because neoprene resists abrasion, oil and temperature extremes, these stabilizers *stay* on the job, even under toughest hole conditions.

FREE! THE NEOPRENE NOTEBOOK. Every issue contains interesting stories, illustrated case histories and new applications of neoprene. To receive it regularly, mail the coupon below.

Oil field men know . . . it pays to specify NEOPRENE

NEOPRENE

The rubber made by Du Pont since 1932

DU PONT

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

E. I. du Pont de Nemours & Co. (Inc.)
Rubber Chemicals Division WO-11, Wilmington 98, Del.

Please put my name on the mailing list for the Neoprene Notebook.

*Name*_____ *Position*_____

*Firm*_____

*Address*_____

*City*_____ *State*_____

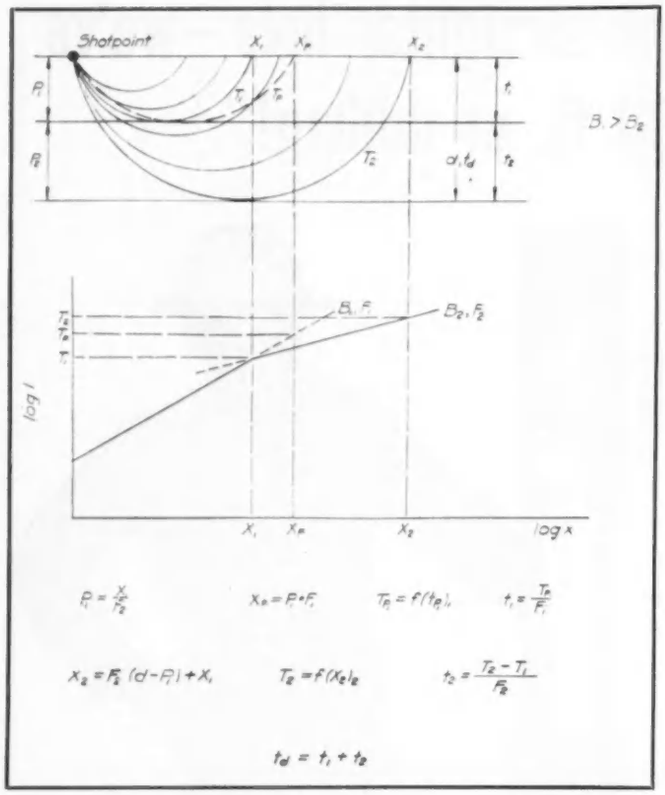


Fig. 5—Computing steps for a two-zone condition, Case 2.

ordinate with X_{p1}, on the extension of the B_1 line. Times along the line B_1 represent rays that do not reach the boundary before they become secondary breaks. An approximate value for the penetration, P_1, through the first layer may be obtained by dividing the distance to the knee, X_1, by the F_2 value for the second layer. This penetration value if multiplied by F_1 will give the distance, X_{p1}, at which the extreme path through the first layer emerges. The travel time T_{p1}, is the coordinate of X_{p1}, on the B_1 line. The first layer penetration time t_1 is this travel time divided by the F_1 value for the first layer. The penetration through the second layer is multiplied by its F_2 value to obtain the incremental distance to be added to X_1, to obtain the X_2 value associated with d, thus enabling T_2 to be read. The solution is then obtained as in Case I.

In summary it can be said that in some areas the near-surface velocities appear to increase rather uniformly with depth down through a considerable thickness of near-surface materials. When such a condition exists the observed first arrival time-distance data will appear to fall on a smooth curve and should not be approximately represented by a series of segments of straight lines. In this event, multiple layer computations involving intercepts and slopes and assuming straight line paths is not applicable. If an empirically determined time-distance equation is a simple increasing function, then the velocity distribution function is a similar equation, and for any given set of data the penetration time can be rather easily computed for an assumed predetermined peel-off depth. The above theory is complete only so long as the assumptions involved are valid.—**The End.**

more money in the bank . . .

YOU SAVE when you log as you drill with Geolograph because Geolograph gives the driller the information he needs to do the most efficient job! Shallow or deep . . . you get more for your drilling dollar with Geolograph on the job!

GEOLOGRAPH
MECHANICAL WELL LOGGING SERVICE
P.O. Box 1291 • Oklahoma City 1, Okla.

Farmington, New Mex. • Liberal, Kan. • Oklahoma City, Okla. • Bakersfield, Cal. Abilene, Houston, Odessa, Lubbock and Wichita Falls, Tex. • Shreveport, and Baton Rouge, La. • Casper, Wyo. • Glendive, Mont. • Sterling, Colo. Edmonton, Alberta, Canada

REFERENCES

[1] Maurice Ewing and L. Don Leet, "Geophysical Prospecting—1932," AIME.
[2] Personal communications.
[3] "A Refraction Theory Adaptable to Seismic Weathering Problems," *Geophysics*, Vol. 6. pp. 245-253.
[4] B. O. Pierce, "A Short Table of Integrals," Ginn & Co., N. Y.

About the Author

E. J. HANDLEY, executive vice president of Midwestern Geophysical Laboratory, Tulsa, graduated in 1933 with a B.S. in engineering physics from the University of Oklahoma. In 1934 he joined Continental Oil Company and served several years as party chief. From 1943-45 he was geophysicist for British-American Oil Company and then joined Shell Oil Company as a seismograph supervisor. He was vice president in charge of all field operations with Century Geophysical Corporation from May, 1946 to March, 1950, and was a director and an original incorporator of that firm. He has been with Midwestern since 1950 and helped organize that company.

Exploratory Drilling . . . in September and First Nine Months 1954-1953

State or District	MONTH OF SEPTEMBER, 1954													FIRST NINE MONTHS, 1954																	
	Productive Tests									Total Productive	Unproductive Tests			Total Exploratory Tests	Productive Tests									Total Productive		Unproductive Tests			Total Dry		Total Exploratory Tests	
	New Fields			New Pays			Extensions								New Fields			New Pays			Extensions										
	Oil	Dis.	Gas	Oil	Dis.	Gas	Oil	Dis.	Gas		Wildcats	New Pays	Outposts		Oil	Dis.	Gas	Oil	Dis.	Gas	Oil	Dis.	Gas	9 Mo. 1954	9 Mo. 1953	Wildcats	New Pays	Outposts	9 Mo. 1954	9 Mo. 1953	9 Mo. 1954	9 Mo. 1953
Alabama											4			4												49			49	60	49	60
Arizona																										8			8	6	8	6
Arkansas							1			1	15			16	2		1	2		1	2			8	25	82		4	86	90	94	115
California	3		1	2						6	29			35	15		3	8		1	3		2	32	58	257		2	259	353	291	411
Colorado	6		1				1			8	53		2	63	36	4	12	2		1	2		1	58	37	386		8	394	222	452	259
Florida											2			2	1									1		24			24	28	25	28
Georgia																										7			7	5	7	5
Idaho																										1			1	4	1	4
Illinois	2			6			6			14	42			56	19			25			45			89	63	434			434	336	523	399
Indiana	1									1	16			17	9		2							11	34	172			172	272	183	306
Kansas	13		6							19	70			89	84		20	4		1	4		1	114	129	572		1	573	674	687	803
Kentucky											5			5	21									21	21	38			38	88	59	109
Louisiana	2	3	1	4	4	1	4			19	34		2	55	24	20	14	35	30	9	5	2	2	141	104	285		14	299	298	440	402
North Louisiana				1			2			3	19		1	23	4	1	3	6	2	3	2			21	23	113		3	116	151	137	174
South Louisiana	2	3	1	3	4	1	2			16	15		1	32	20	19	11	29	28	6	3	2	2	120	81	172		11	183	147	303	228
Michigan											17			17	9						1			10	16	158			158	184	168	200
Mississippi	1		1							2	19			21	4		1					1		6	21	124		4	128	146	134	167
Missouri																										6			6	10	6	10
Montana	1		1							2	15			17	5		2	2			1			10	13	75			75	81	85	94
Nebraska	7						1			8	9			17	22		3	1			4			30	21	97		2	99	114	129	135
Nevada															1									1		9			9	8	10	8
New Mexico	2		1	1		1			1	6	13			19	14		30	5	2	1	6		1	59	54	126		1	127	105	186	159
North Carolina																														1		1
North Dakota											4			4	1			1			2			4	11	78			78	49	82	60
Ohio									1	1	2			3							3		4	7	5	11			11	12	18	17
Oklahoma	8		2	3			6			19	57		4	80	82	8	15	22	1	1	52	2	2	185	203	534		4	538	536	723	739
Pennsylvania																									1						1
South Dakota															1									1		10			10	14	11	14
Tennessee																													1		1
Texas	42	11	3	21	4	4	10	1	2	98	364		6	468	414	64	71	184	45	19	83	11	14	905	875	3161		49	3210	3173	4115	4048
Dist. 1 S. Central	3			1						4	36		1	41	22	2	5	2	1	1	7	2	2	44	24	230		2	232	239	276	263
Dist. 2 Middle Gulf		3		1			1	1	1	5	23			28	5	11	11	4	3	3	3	1	2	43	57	205		4	209	211	252	268
Dist. 3 Upper Gulf	1	5		3	3	1		1		15	33			48	16	14	4	52	20	5	2		1	114	122	305		26	331	314	445	436
Dist. 4 L.Gulf-S.W.	3	2		7	1					14	25		2	41	19	21	3	41	16	4	2	6	2	114	152	276		7	283	363	397	515
Dist. 5 E. Central											14			14	2			1			1			4	8	110			110	87	114	95
Dist. 6 Northeast		1								1	17			18	2	3	1	2	2					10	17	124		2	126	114	136	131
Dist. 7-B N. Cent.	13		1							14	99			113	131	1	24	18			8		2	184	187	690		2	692	710	876	897
Dist. 7-C W. Cent.	7		1	2		1	1		1	13	30		2	45	41	4	9	9	1	2	8		2	76	75	276		3	279	262	355	337
Dist. 8 West	3			4			4			11	30		1	42	74	2	3	28	1	2	39	1	1	151	98	306		2	308	281	459	379
Dist. 9 North	10		1	3		1	3			18	52			70	98	4	4	26		1	12		1	146	133	593		1	594	586	740	719
Dist. 10 Panhandle	2						1			3	5			8	4	2	7	1	1	1	1	1	1	19	2	46		1	46	6	65	8
Utah											6			6	2		2							4	9	27			27	33	31	42
West Virginia											1			1												1			1		1	
Wyoming	2		1		1	1				5	15			20	50		5	7	1	1	3			67	25	153			153	93	220	118
Total U. S.	90	14	18	37	9	7	29	1	4	209	792		14	1015	816	96	181	298	79	35	216	16	27	1764	1725	6885		89	6974	6996	8738	8721

Exploration Ahead of 1953

Year's activity apparently headed for new all-time record.

By CECIL W. SMITH, WORLD OIL Staff

EXPLORATORY DRILLING was quite active during September, and the month's 1015 completed tests boosted the year's total to 8738, which was 17 wells more than were completed in the first nine months of 1953. Last year's work set a new all-time high mark, but the current drilling campaign has kept pace and even remained slightly ahead.

The month's efforts were rewarded with 209 successful tests, 175 new discoveries and 34 field extension wells. Oil discoveries numbered 127, 90 new fields and 37 new pay horizons in established fields.

Also on the credit side were 23 new distillate finds, 14 new areas and nine new pays. Gas discoveries totaled 25 during September and they included 18 new gas fields and seven new horizons.

Of the tests completed in the first three quarters of this year, 1764 proved to be commercial producers, 1505 opened new pools and 259 added major extensions to existing fields. A year earlier, total successful wells had numbered 1725.

This year's oil discoveries totaled 1114, 816 new fields and 298 new pays in older fields. New distillate pools amounted to 96 new fields and 79 new pays for a total of 175 new finds. Gas discoveries totaling 216 were recorded during the nine months and they were made up of 181 new gas fields and 35 new gas pays.

In nine months, the producing limits of 259 fields were extended, while a year earlier the total had been 308.

Summary of Results of Exploratory Drilling

ITEM	Sept., 1954	Aug., 1954	NINE MONTHS January-September 1954	1953	Percent Diff.
Oil Discoveries	127	123	1114	1082	+ 3.0
New Fields	90	80	816	792	+ 3.0
New Pays	37	43	298	290	+ 2.8
Distillate Discoveries	23	19	175	126	+ 38.9
New Fields	14	10	96	77	+ 24.7
New Pays	9	9	79	49	+ 61.2
Gas Discoveries	25	23	216	209	+ 3.3
New Fields	18	21	181	173	+ 4.6
New Pays	7	2	35	36	— 2.8
Total Discoveries	175	165	1505	1417	+ 6.2
Extensions to Fields	34	14	259	308	— 15.9
Oil Fields	29	12	216	248	— 12.9
Distillate Fields	1		16	23	— 30.4
Gas Fields	4	2	27	37	— 27.0
Total Prod. Tests	209	179	1764	1725	+ 2.3
Dry Holes	806	885	6974	6996	— 0.3
Wildcats	792	871	6885	6873	+ 0.2
New Pays				1	
Outposts	14	14	89	122	— 27.1
Total Expl'tory Tests	1015	1064	8738	8721	+ 0.2
Percent Productive	20.6	16.8	20.2	19.8	
Percent Dry	79.4	83.2	79.8	80.2	

U. S. Discoveries in September

NEW FIELDS, NEW PAYS AND EXTENSIONS

ARKANSAS—OIL FIELD EXTENSION

Lafayette County, Kiblah field. Arthur Richenthal's Olivia S. Moore 1, C SW NW, 2-20s-26w, 1⅛ mile northeast extension, flowed 200 barrels from Mitchell (Rodessa) sand, Lower Cretaceous 6001-6 feet, ¼-inch, 46-gravity, completed 9-9-54, TD 6025.

CALIFORNIA—NEW OIL FIELDS

Kern County, Northwest Lost Hills area. The Texas Co.'s Overall 2 in 33-25s-20e, pumped 14 barrels from 2145-3176 feet, completed 8-31-54, TD 3278.

Santa Barbara County, Cuyama, South field. Richfield Oil Corp.'s Hibberd 112-6, in 6-9n-26w, flowed 123 barrels from Santa Margarita sand, Miocene 2181-2222 feet, 14/64-inch, 27- gravity, completed 9-22-54, TD 2222.

Ventura County, Coyote Creek field. Honolulu Oil Corp.'s Honolulu-Sunray Dunshee 1, in 28-4n-24w, pumped 13 barrels, 18-gravity, completed 9-8-54, TD 7594.

CALIFORNIA—NEW OIL PAYS

Fresno County, Guijarral Hills field. Standard Oil Co.'s "27 F" 78, in 27-20s-16e, Old Well Drilled Deeper, pumped 249 barrels from 8668-95 feet, 35.4-gravity, completed 8-31-54, TD 8730.

Kern County, Belgian Anticline field. The Ohio Oil Co.'s F. E. Smith-Gov't 1, in 23-30s-21e, flowed 950 barrels from Oceanic sand, Oligocene 5686-95 feet, 22/64-inch 32.5-gravity, completed 9-9-54, TD 5810.

CALIFORNIA—NEW GAS FIELD

Glenn County, Beehive Bend, north field. Richard S. Rheem, Operator's Zumwalt 1-63, in 2-19n-2w, flowed 6.3 million from Zumwalt sand, 5932-44, ⅜-inch, completed 9-18-54, TD 6185.

COLORADO—NEW OIL FIELDS

Adams County. Ryan Oil Co.-Davis Oil Co. & Potter Drilling Co.'s Doss 1, SE SE SW 8-2s-59w, flowed 30 barrels from "J" sand, Upper Cretaceous 6254-62 feet, ¾-inch, completed 9-4-54, TD 6321.

Morgan County, Ft. Morgan field. Lario O&G Co.'s Solt 1, SE SE NW 25-3n-58w, flowed 504 barrels from "D" sand, Upper Cretaceous 5558-60 feet completed 9-30-54, TD 5585.

Washington County. Jay Taylor & Bruce Sullivan's T. H. Rediess 1, C SE SE 9-2n-54-w, pumped 300 barrels from "J" sand, Upper Cretaceous 4799-4807 feet, completed 9-18-54, TD 4866.

Unnamed field. Phillips Petroleum Co.'s Augusta King 1, SE SW NE 13-11n-57w, flowed 106 barrels from "J" sand, Upper Cretaceous 6424-40 feet, 16/64-inch, completed 9-2-54, TD 6581.

Unnamed field. Wytex Service Corp.'s Frank Forbes 1, C SW SE 14-1n-54w, pumped 155 barrels from "J" sand, Upper Cretaceous 4994-96 feet, completed 9-29-54, TD 5036.

Big Beaver field. New Drilling Co.'s Blomenkamp 1, C NE NE 17-3s-56w, flowed 685 barrels from "J" sand, Upper Cretaceous 4992-99 feet, completed 9-6-54, TD 5135.

COLORADO—OIL FIELD EXTENSION

Moffat County, Ace Unit field. Mountain Fuel Supply Co.'s Unit 5, SE SW SE 28-12n-97w, flowed 127 barrels from Wasatch sand, Eocene 3042-57 feet, 52-gravity, completed 9-1-54, TD 3100.

COLORADO—NEW GAS FIELD

Moffat County. Quintana Production Co.'s C. F. & I. Corp. 1, NE SE SW, 13-12n-89w, flowed 1.5 million from Mesaverde sand, Upper Cretaceous 2524-42 and 3098-3110 feet, completed 8-7-54, TD 8525.

ILLINOIS—NEW OIL FIELDS

Clay County, Iola, Central field. T. Doran's Hamilton 1, SW SW SE 32-5n-5e, Old Well Worked Over, pumped 25 barrels oil and 65 barrels water from Bethel sand, Mississippian 2417-24 feet, completed 9-7-54, TD 2591.

Macon County, Harristown field. Dell Carroll's A. F. Krall 1, NW NE SW 14-16n-1e, pumped 65 barrels from Silurian lime 2050-80 feet, completed 9-21-54, TD 2080.

ILLINOIS—NEW OIL PAYS

Crawford County, Main Consolidated field. W. H. Davison's M. A. Jewell 1, SW SW NE 17-5n-12w, pumped 300 barrels from Cypress sand, Mississippian 1430-67 and 1481-92 feet, completed 9-14-54, TD 1503.

Hamilton County, Cantrell Consolidated field. W. J. McGlasson's B. Waller 1, SW SE NE 8-7s-5e, pumped 120 barrels from Cypress sand, Mississippian 2908-12 feet, completed 9-7-54, TD 2914.

Thackeray field. Calvert Drilling Co.'s McClosky 1, NW NW NW 10-5s-7e, pumped 103 barrels oil and 10 barrels water from Rosiclare lime, Mississippian 3493-3506 feet, completed 9-14-54, TD 3550.

Jefferson County, Ina field. Nash Redwine's Whittington 1, NE SE SW 30-4s-3e, pumped 15 barrels oil and 2 barrels water from Renault sand, Mississippian 2726-46 feet, completed 9-21-54, TD 2853.

Saline County, Eldorado Consolidated field. J. R. Grandin et al's Kittinger 1, NW SW SE 8-8s-7e, pumped 27 barrels oil and 50 barrels water from Cypress sand, Mississippian 2534-41 and 2578-92 feet, completed 9-21-54, TD 2930.

White County, Norris City field. C. E. Brehm's G. Martin Community 1, SW NW NW 33-6s-8e, pumped 50 barrels oil and 24 barrels water from Paint Creek sand, Mississippian 2780-83 feet, completed 9-28-54, TD 3148.

ILLINOIS—OIL FIELD EXTENSIONS

Christian County, Mt. Auburn Consolidated field. V. D. Jarvis' L. A. Fulk et al 1, NE NE NW 15-15n-1w, 1½-mile east extension, pumped 20 barrels oil and 55 barrels water from Silurian lime, 1909-17 feet, completed 9-14-54, TD 1924.

Crawford County, Main Consolidated field. J. G. Beard's Bassett 2, NW NW SW 4-8n-12w, 1-mile extension, pumped 20 barrels oil and 3 barrels water from Pennsylvanian sand, Pennsylvanian 1112-36 feet, completed 9-21-54, TD 1151.

Madison County, Livingston, South field. G. Cassens' Brandt 2, NW SE 29-6n-6w, ¾-mile north extension, pumped 3 barrels from Pennsylvanian sand, Pennsylvanian 524-40 feet, completed 9-28-54, TD 540.

Marion County, Iuka field. Welker Oil Co.'s I. C. Tullis 1, SE SW SW 10-2n-4e, ½-mile west extension, pumped 32 barrels oil and 150 barrels water from McClosky lime, Mississippian 2700-36 feet, completed 9-7-54, TD 2825.

Sangamon County, Roby field. W. L. Swope et al's Morris and Brest 1, NW SW NE 3-15n-3w, 1-mile north extension, pumped 34 barrels from Silurian lime 1728-67 feet, completed 9-14-54, TD 1822.

White County, Burnt Prairie, South field. C. C. Beebe's E. Merritt 1, SW NW SW 5-4s-9e, ¾-mile extension, pumped 50 barrels oil and 50 barrels water from McClosky lime, Mississippian 3461-65 feet, completed 9-14-54, TD 3475.

INDIANA— NEW OIL FIELD

Posey County. Clyde Nash's Joseph Gumble 1, SE SE SW 36-6s-12w, pumped 15 barrels from Cypress sand, Mississippian, TD 2178.

KANSAS—NEW OIL FIELDS

Barber County, Whelan, Southwest field. Harms-Burt Drilling Co.'s Smith 1, NW NW NW 1-3s-12w, flowed 93 barrels from Mississippi sand, Mississippian 4230-40 feet, TD 4240.

Cowley County. Orville Parker's Hockenbury 1, NE NE SE 29-3s-5e, pumped 25 barrels from Cleveland sand, Pennsylvanian 2642-52 feet, TD 2700.

Ellis County, Walter, Southeast field. Birmingham-Bartlett Drilling Co.'s Walter 1, SW SE SE 13-12s-18w, pumped 199 barrels from Arbuckle lime, Ordovician 3658-62 feet, TD 3662.

Graham County, Schmied, Northeast field. Wentworth Drilling Co.'s Walts 1, SW SW SW 10-8s-25w, pumped 175 barrels from Lansing lime, Pennsylvanian 3867-92 feet, TD 3965.

Van field. N. C. R. A.'s Van Loenen 2, NE NE NE 14-9s-22w, pumped 114 barrels from Arbuckle lime, Ordovician 3873-75 feet, TD 3875.

Meade County. Ohio Oil Co.'s W. H. Bond 1, NW NW SE 32-33s-30w, pumped 129 barrels from Lansing lime, Pennsylvanian 4619-31 feet, TD 5890.

Pawnee County, Garfield, Northeast field. Knight Drilling Co. & N. C. R. A.'s Hutchison Estate 1, NW NW NW 3-23s-17w, flowed 1413 barrels from Mississippi

big... ANY WAY YOU LOOK AT IT

BIG IN CAPACITY. BIG IN EFFICIENCY. BIG IN EARNING POWER.

Undisputed load-carrying champions, only these Macks deliver so many specific working advantages to oilfield equipment haulers.

A fast trip from site to site is assured by the high maneuverability of Mack chassis design and the easy control of power-steering.

All-weather operation regardless of terrain because Mack six-wheelers have the famous Balanced Bogie that won't bog down. Only Mack offers the exclusive Power Divider which distributes torque between bogie axles in proportion to traction, pulls through where ordinary trucks mire in.

Safety plus real driver satisfaction with masterful air-actuated brakes and easy-to-operate air-assist clutch.

The right powerplant to haul most efficiently, most profitably for each specific operation, provided by a complete range of engine options up to 300 horsepower.

The right transmissions permit high speeds when running light, provide extremely low speed ratios for winching operations.

WHEREVER YOU SEE A TOUGH JOB . . .
THERE IS WHERE YOU SEE MACKS

Mack TRUCKS

Mack Trucks, Empire State Bldg., N. Y. 1, N. Y. Factory branches and distributors in all principal cities for service and parts. In Canada: Mack Trucks of Canada, Ltd.

2227

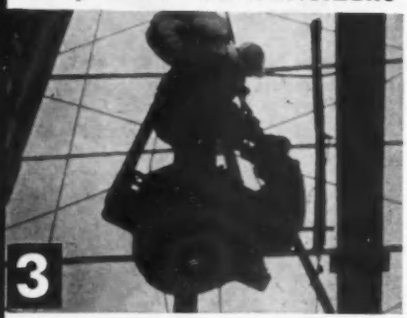
3 REQUIREMENTS For a GOOD Cement Job

1

B and W Scratchers

2

B and W LATCH-ON CENTRALIZERS



3

MOVEMENT OF CASING *

*The highest percentage of successful cement jobs result from . . . mud removal and prevention of channelling by . . . movement of the casing, from the time casing reaches bottom until the plug "bumps."

B and W Inc.
Well Completion Specialists

GULF COAST
Box 5266
Houston 12, Texas
Phone WE-6603

WEST COAST
Box 3751
Los Angeles 54, Calif.
Phone ME-4-1106

lime, Mississippian 4150-58 feet, TD 4409.

Jay field. Atlantic Refining Co.'s Jay T. Smith 1, NW NW SW 3-23s-15w, pumped 196 barrels from Simpson sand, Ordovician 4023-37, TD 4088.

Shiley, East field. N. C. R. A.'s Ekert 1, NW NW NW 18-20s-19w, pumped 120 barrels from Cherokee sand, Pennsylvanian 4223-25 feet, TD 4685.

Rice County, Bushton field. Lario O&G Corp.'s Shonyo 1, SW SW SE 11-18s-10w, pumped 20 barrels oil and 210 barrels water from Arbuckle lime, Ordovician 3281-9 feet, TD 3300.

Rooks County, Dopita, Southeast field. Harold Patton's Fike 1, NW NW SE 5-9s-17w, pumped 203 barrels from Lansing lime, Pennsylvanian 3336-40 feet, TD 3475.

Stafford County. West-Pan Hydrocarbon's Seever 1, SW SE SE 6-25s-7e, pumped 14 barrels from Lansing lime, Pennsylvanian 3912-16 feet, TD 4310.

Trego County, Hixson, East field. Stanolind O&G Co.'s Scott 1, NW SW SW 16-11s-22w, pumped 39 barrels from Marmaton sand, Pennsylvanian 3844-54 feet, TD 3970.

KANSAS—NEW GAS FIELDS

Barber County. Barbara Oil & R. C. Patton's McClure 1, SW SW SW 6-33s-11w, flowed 3.3 million from Douglas sand, Pennnsylvanian 3548-71 feet, TD 4891.

Little Bear Creek field. Purcell & Mull's Pearl Lake 1, NW SW NW 12-32s-14w, flowed 10.0 million from Douglas sand, Pennsylvanian 3808-98 feet, TD 4865.

Harper County, Anthony field. Gulf Oil Corp.'s Rife 1, SW NE SW 31-33s-6w, flowed 0.2 million from Mississippi sand, Mississippian 4486-4964, TD 5147.

Kingman County, Spivey, Northwest field. Petroleum, Inc. & Anschutz Drilling Co.'s Evans 1-A, SE SW SE 9-30s-8w, flowed 3.4 million from Mississippi sand, Mississippian 4156-80 feet, TD 4659.

Kiowa County. Aladdin Petroleum Co.'s Jonansen 1, C SE SE 13-28s-19w, flowed 1.0 million from Mississippi sand, Mississippian 4860-90 feet, TD 5510.

Seward County. Panhandle Eastern's Boles 1, C N½ NE 4-35s-34w, Old Well Drilled Deeper, flowed 9.7 million from Toronto sand, Pennsylvanian 4396-4418 feet, TD 4556.

NORTH LOUISIANA—NEW OIL PAY

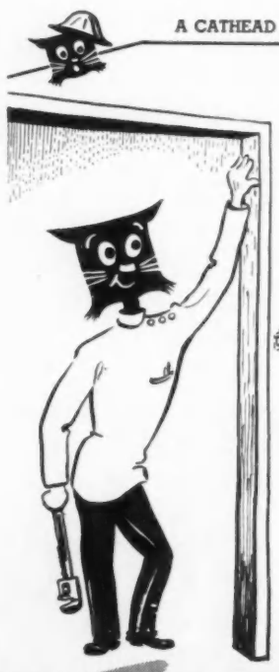
Webster Parish, Cotton Valley field. Cotton Valley Operator Committee's Hunt-Gaines 1, C NW NE 30-21n-9w, Old Well Drilled Deeper, flowed 105 barrels from Justiss sand, Jurassic 8981-95 and 9056-64 feet, 13/64-inch, 57.5-gravity, completed 9-21-54, TD 9150.

NORTH LOUISIANA—OIL FIELD EXTENSION

Tensas Parish, Holly Ridge field. Union Producing Co.'s Penrod-Jurden 15, in 17-11n-10e, 1-mile north extension, flowed 65 barrels from Wilcox sand, Eocene 3031-2 feet, 7/64-inch, 28.5-gravity, completed 9-26-54, TD 5740.

Rodney Island field. Midstates Oil Corp.'s J. M. Harper 1, in 12-10n-12e, 1-mile north extension, flowed 183 bar-

A CATHEAD FOR EVERY NEED



DOC CAT
JOINT SPECIALIST

To be the best
. . . you SPECIALIZE!
FOSTER makes ONLY Catheads
. . . and makes them BEST!

For the most efficient joint breaking or spinning you can always depend on FOSTER CATHEADS to give you the safest, surest, most economical job.

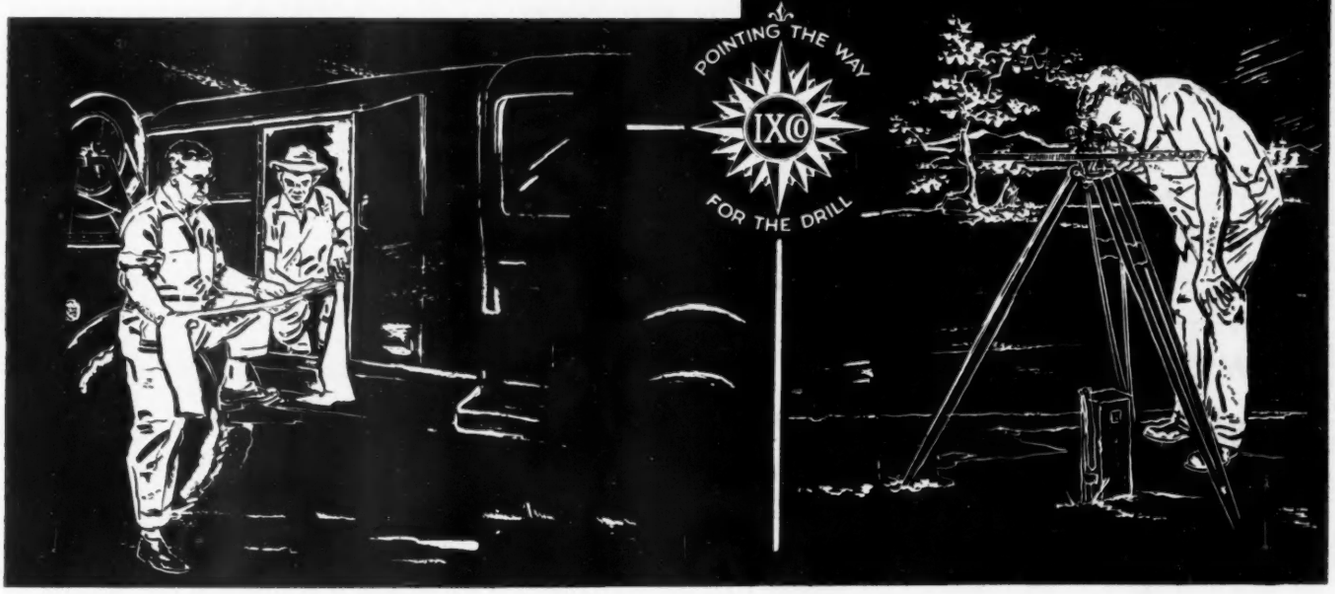
Foster CATHEAD COMPANY
P. O. BOX 1351 — WICHITA FALLS, TEXAS
2101 GRANT ST. — PHONE 2-8653

R. N. Bean — Los Angeles, California
Moore Specialty Company — Casper, Wyoming
Tillery & Parks — Odessa, Texas
Peck Sales & Service — Houston, Texas
F. M. Farrier — Wichita Falls, Texas
Garlick Sales & Service — Oklahoma City, Oklahoma
Northern Well Equipt. Co. — Tioga, N. Dak.
Texas Warehouse Service — Corpus Christi, Texas
R. D. Cloninger — Lafayette, La.
Rotary Sales & Serv., Ltd. — Edmonton, Alberta, Can.
W. O. Nelson — Farmington, N. M.
Longley Y. Cia., S.R.L., (Ken Langley) — Buenos Aires
L. W. Mauck — Great Bend, Kansas
Joe Perry — Salem, Illinois

When he knows every job a crew performs, then a man is considered for the responsible position of an IX Party Chief. E. I. Grizzell worked his way up through a crew as a permit man, a surveyor, and a computor before he became a Party Chief. Grizzell's 18 years of field work with IX consistently results in better, more accurate survey work for our clients.

DERRICKS TODAY

Where I.X. Parties Were Yesterday



You can depend on the results of an IX survey! Your survey from Independent Exploration Company is made by parties that have been doing this identical work for years and years.

These parties are staffed with men who have made geophysical surveying their life work; who have watched new fields opened after their preliminary work. To IX personnel like these, your survey is important — will receive the extra care that will make your results clearer, more accurate, *and* a better value!

Independent

EXPLORATION COMPANY

Geophysical Surveys

1973 West Gray, Houston, Texas

39 Victoria St., London, SW 1, England

Room 8, London Bldg., 620 8th Ave. W., Calgary, Alberta, Canada

rels from Massive sand, Upper Cretaceous 9250-55 feet, 9/64-inch, 41-gravity, completed 9-8-54, TD 9300.

SOUTH LOUISIANA—NEW OIL FIELDS

Jefferson Davis Parish. Ada Oil Co.'s Powell Lumber Co. 1, C NW SE 30-7s-4w, flowed 77 barrels from 8257-61 feet, 8/64-inch, 43.2-gravity, completed 9-1-54, TD 8921.

St. Landry Parish, Swords area. Fidelity Oil & Royalty Co.'s Linzay Brown 1, in 47-6s-2e, flowed 113 barrels from 8847-55 feet, 7/64-inch, 38-gravity, completed 8-26-54, TD 9526.

SOUTH LOUISIANA—NEW OIL PAYS

LaFourche Parish, Bay Marchand-Block 2. The California Co.'s State Lease 1365-1, in 24-23s-23e, flowed 187 barrels from Upper Miocene sand 7228-52 feet, 28/64-inch, 28-gravity, completed 9-20-54, TD 7603.

Plaquemines Parish, Dixon Bay field. The California Co.'s State Lease 1923-2, in 23s-31e, flowed 119 barrels from 8946-80 feet, 7/64-inch, 32.6-gravity, completed 8-27-54, TD 10,700.

St. Mary Parish, Eugene Island-Block 126. Magnolia Petroleum Co.'s State Lease 691-1-H, Block 119, Gulf of Mexico, flowed 145 barrels from 5600-20 feet, 12/64-inch, 35-gravity, and 270 barrels from 5918-30 feet, 11/64-inch, 37.3-gravity, completed 9-20-54, TD 6000.

SOUTH LOUISIANA—OIL FIELD EXTENSIONS

Calcasieu Parish, Gillis field. Richardson & Bass' Drew Manual Training School 1, in 36-8s-8w, 1¾-mile north extension, flowed 214 barrels from Lower Miocene sand 8104-9 feet, 8/64-inch, 37.6-gravity, completed 9-7-54, TD 10,733.

LaFourche Parish, Chacahoula field. Howell, Holloway, & Howell's Energy Realty Inv. Co. 1, in 65-15s-16e, ½-mile northeast extension, flowed 42 barrels from Upper Miocene sand 12,640-2 feet, 6/64-inch, 37-gravity, completed 9-4-54, TD 14,642.

SOUTH LOUISIANA—NEW DISTILLATE FIELDS

Acadia Parish, Iota area. Tamborello-Rasberry's Andrepont-Lejeune 1, in 42-8s-1w, Old Well Drilled Deeper, flowed 59 barrels distillate and 1.5 million from 9407-13 feet, 12/64-inch, 62.9-gravity, completed 9-16-54, TD 9917.

Iberville Parish, Bayou Sorrel area. Shell Oil Co.'s Schwing Lumber Co. 1, in 99-10s-10e, flowed 130 barrels distillate and 3.7 million from 10,974-80 feet, 15/64-inch, 52.6-gravity, completed 9-19-54, TD 11,300.

LaFourche Parish. J. R. Frankel's Southdown Sugars Inc. 1, in 111-14s-16e, flowed 50 barrels distillate and 3.0 million from 11,890-8 feet, ¼-inch, completed 8-20-54, TD 12,500.

SOUTH LOUISIANA—NEW DISTILLATE PAYS

Acadia Parish, Rayne field, (NE Flank). Continental Oil Co. & Sun Oil Co.'s J. S. Arceneaux Sr. Estate 1, in 3-9s-2e, flowed 295 barrels distillate and 4.5 million from Homeseekers "E" sand, Oligocene 12,540-680 feet, 12/64-inch, 50-gravity, completed 9-7-54, TD 13,020.

Assumption Parish, East Lake Palourde field. The California Co.'s Lutcher & Moore Lumber Co. et al 1, in 30-15s-14e, flowed 50 barrels distillate and 57.0 million from 12,538-606 feet, ¾-inch, 45-gravity, completed 9-10-54, TD 13,500.

St. Bernard Parish, Eloi Bay field. Phillips Petroleum Co.'s Gate 1, Block 49, Chandoleur Sound Area, flowed 5 barrels distillate and 2.4 million from Upper Miocene sand, 7041-5 feet, 12/64-inch, completed 9-7-54, TD 7105.

Terrebonne Parish, Lirette field. Humble's Henry J. Ellender 7, in 23-19s-19e, flowed 7 barrels distillate and 2.4 million from 5764-78 feet, ¼-inch, 49.1-gravity, completed 9-26-54, TD 11,700.

SOUTH LOUISIANA—NEW GAS FIELD

Vermilion Parish, Gueydan, South field. Pure Oil Co.'s Vermilion Public School Board 2, in 16-12s-1w, flowed 4.4 million from 10,498-516 feet, ⅛-inch, completed 9-24-54, TD 11,586.

SOUTH LOUISIANA—NEW GAS PAY

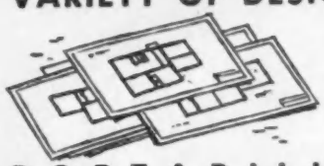
Cameron Parish, Deep Lake field. Union Producing Co.'s Rockefeller-State Lease 2340-2, in 7-16s-3w, flowed 8.0 million from 14,380-4 feet, 20/64-inch, completed 9-21-54, TD 14,426.

MISSISSIPPI—NEW OIL FIELD

Adams County, "Popular Grove" field. Serio-Punches Oil Co.'s Emery 2, in 45-6n-2w, flowed 115 barrels from Wilcox sand, Eocene 6292-7 feet, ¼-inch, 39-gravity, completed 9-13-54, TD 6522.

GET THESE EXTRAS IN
STURDYBILT
PREFABRICATED HOUSES

VARIETY OF DESIGNS . . .



Choose from a large selection of homes, garages, warehouses and other buildings. Get what you want in STURDYBILT.

PORTABILITY . . .

Complete housing sections moved anywhere a truck can go. Buildings erected on your site in days instead of weeks.

DEMOUNTABILITY . . .

Move your STURDYBILT houses when you abandon an old site. They can be erected on new location with practically no loss of material.

ONE SOURCE . . .

One purchase order takes care of designing, transporting and erecting. Truly one stop buying when you get STURDYBILT Prefabricated Houses.

MANUFACTURERS OF SPECIAL MILLWORK: DISTRIBUTORS OF JOHNS-MANVILLE BUILDING MATERIALS; CURTIS WOODWORK

STURDYBILT PREFABRICATED, DEMOUNTABLE HOUSES

SOUTHERN MILL & MANUFACTURING CO. • TULSA, OKLAHOMA

phmi

STURDYBILT HOUSES COMPLY WITH COMMERCIAL STANDARD CS125 OF THE NATIONAL BUREAU OF STANDARDS FOR PREFABRICATED HOMES

ON LAND OR WATER

Standardize on Standard

South Louisiana is today the most active area in U.S. crude oil production and renewal of its off-shore development will accelerate the tempo of this production.

● "Mr. Charlie," the submersible drilling barge built by Alexander Shipyard for Ocean Drilling & Exploration Co., and leased to Shell Oil Co.

9 STORES Conveniently Located

STANDARD pioneered in servicing the oil industry of the Gulf Coast. 9 big stores, completely stocked with the finest drilling and production equipment, are strategically located with respect to the active fields in this area . . .

STANDARD may be relied upon to render its prompt and dependable service to this great progressive industry . . . the service that has earned the good will of operators throughout the Gulf Coast region.

DISTRIBUTING THE PRODUCTS OF THESE LEADING MANUFACTURERS

AMERICAN IRON AND MACHINE WORKS
AMERICAN MANUFACTURING CO.
ASHCROFT GAUGES
BAASH-ROSS CO.
BYRON JACKSON CO.
CAMERON IRON WORKS
ELWOOD VALVE MFG. CO.
GATES RUBBER CO.
HANCOCK VALVES
HEWITT RUBBER CORP.
HUGHES TOOL CO.
LINK-BELT CO.
LUNKENHEIMER CO.
MISSION MFG. CO.
NATIONAL TRANSIT PUMP & MACHINE CO.
NATIONAL TUBE CO.
NORDSTROM VALVE CO.
W. C. NORRIS COMPANY
PHELAN FAUST PAINT CO.
REED ROLLER BIT CO.
ROEBLING STEEL CORP.
ROSS-GELMAN CORP.
STOCKHAM VALVES & FITTINGS, INC.
TAYLOR FORGE & PIPE WORKS
WEB WILSON OIL TOOLS
WHITLOCK CORDAGE CO.
WICKWIRE SPENCER STEEL CO.
WORTHINGTON CORP.

Seals Threaded Connections

...Withstands Punishing Pressures

THREDKOTE

REG. U. S. PAT. OFF.

A complete line of thread compounds

TYPE	USE
THREDKOTE 701	A 60% metallic zinc product for tool joints — both for bucking joints on drill pipe and for pin and box threads in field applications. Also drill collars, casing and tubing.
THREDKOTE 702	A graphite product for casing, steam lines, water lines.
THREDKOTE 703	A special product for oil well tubing in high pressure (over 2000 p.s.i.) condensate wells. May also be used for drill collars and tool joints.
THREDKOTE 705	An economical product especially compounded for use on worn tool joints when fillers are desired.
THREDKOTE 708	A synthetic product for use on threaded connections when resistance to gasoline or other petroleum products is desired. It seals perfectly but the joint may later be broken easily.

• *For full details on* **THREDKOTE** *uses, write:*

HUMBLE

Sales Technical Division
Humble Oil & Refining Co.
P. O. Box 2180
Houston, Texas

HUMBLE OIL & REFINING COMPANY

MISSISSIPPI—NEW GAS PAY

Monroe County, Hamilton field. W. C. Feazel et al's Mrs. L. W. Rea 1, SE 12-15s-18w, Old Well Worked Over, flowed 2.2 million from Carter sand, Mississippian 3365-9 feet, completed 9-24-54, TD 4395.

MONTANA—NEW OIL FIELD

Fallon County. Shell's NPRR 14-34, C SW SW 35-5n-61e, flowed 245 barrels oil and 33 barrels water from Ordovician lime 8203-19 feet, completed 9-15-54, TD 8471.

Golden Valley County. Northern Natural Gas Production Co.'s NPRR 2-A, NW SE 31-5n-20e, flowed 5.5 million from 3rd Cat Creek sand, Lower Cretaceous 1934-2145 feet, completed 9-16-54, TD 2145.

NEBRASKA—NEW OIL FIELDS

Banner County. Harry Royster's Hinshaw 1, SW SW 3-18n-55w, flowed 480 barrels from "D" sand, Upper Cretaceous 5942-8 feet, completed 9-10-54, TD 5987.

Unnamed field. Nebraska Oil Co.'s K. K. Lee 1, SW NE SE 11-18n-56w, pumped 35 barrels oil and 100 barrels water from "J" sand, Upper Cretaceous 6171-80 feet, completed 7-10-54, TD 6182.

Cheyenne County. Harper-Turner & Sanford Production Co.'s Pelster 1, S½ SW SW 27-17n-50w, pumped 35 barrels from "D" sand, Upper Cretaceous 4699-4705 and 4707-4715 feet, completed 8-14-54, TD 4883.

Unnamed field. Lloyd R. Magneson's State 1, NE NW NW 36-15n-48w, pumped 350 barrels from "D" sand, Upper Cretaceous 4376-8 feet, completed 9-10-54, TD 4382.

Kimball County. L. Williamson & C. Kissinger's Swearingen 1, SE SE NE 15-14n-55w, flowed 450 barrels from "J" sand, Upper Cretaceous 6282-90 feet, completed 9-2-54, TD 6330.

Unnamed field. Rock Hill Oil Co.'s Toof 1, NW SW SW 14-13n-55w, pumped 140 barrels from "J" sand, Upper Cretaceous 6301-7 and 6311-17 feet, completed 9-1-54, TD 6367.

Kimball County, Hafeman field. Eddie Fisher's Hafeman 1, SE SE NE 23-14n-55w, pumped 228 barrels from "J" sand, Upper Cretaceous 6182-86 feet, completed 6-25-54-TD 6207.

NEBRASKA—OIL FIELD EXTENSION

Banner County, Unnamed field. Nebraska Oil Co.'s Cross 1, NE SE SW 11-18n-56w, ½-mile southwest extension, pumped 20 barrels from "J" sand, Upper Cretaceous 6140-6 and 6150-60 feet, completed 7-18-54, TD 6174.

NEW MEXICO—NEW OIL FIELDS

Lea County. G. E. Hall's State-Humble 1-A, in 16-15s-36e, flowed 552 barrels from Devonian lime 13,465-510 feet, ½-inch, 57.2-gravity, completed 9-27-54, TD 13,585.

Unnamed field. Superior's G. T. McAlpin 1-23, in 23-18s-35e, flowed 182 barrels from Lower Permian lime 9980-93 feet, 24/64-inch, 42-gravity, completed 9-17-54, TD 12,355.

NEW MEXICO—NEW OIL PAY

Lea County, Maljamar field. Buffalo Oil Co.'s Baish-Federal 25-A, in 21-17s-32e, Old Well Worked Over, flowed 177 barrels from Abo lime, Permian, 8980-8 and 8994-9002 feet, 2-inch, 42.6-gravity, completed 9-1-54, TD 12,119.

NEW MEXICO—NEW GAS FIELD

Rio Arriba County. Stanolind's E. C. Valdez 1, NW SE NE 32-28n-4w, flowed 1.3 million from Mesaverde sand, Upper Cretaceous 6060-6700 feet, completed 9-29-54, TD 6700.

NEW MEXICO—NEW GAS PAY

Rio Arriba County, Blanco field. Southern Union Gas Co.'s Jicarilla 1-G, SE NW SW 1-26n-5w, flowed 1.2 million from Mesaverde sand, Upper Cretaceous 5100-5775 feet, completed 9-2-54, TD 5775.

NEW MEXICO—GAS FIELD EXTENSION

San Juan County, Blanco field. Pubco Development, Inc.'s Russell 2, SW SE SW 33-30n-14w, flowed 1.7 million from Pictured Cliffs sand, Upper Cretaceous 921-939 feet, completed 7-28-54, TD 3512.

OHIO—GAS FIELD EXTENSION

Tuscarawas County, Cambridge field. David Ferguson et al's W. F. Miller 1, Lot 10, Clay Township, flowed 0.6 million from Berea sand, Mississippian 896-9 feet, completed 9-15-54, TD 900.

OKLAHOMA—NEW OIL FIELDS

Carter County, Ardmore, Southwest field. C. W. Tomlinson's Farve 1, SE NE SW 23-5s-1e, flowed 174 barrels from Tulip Creek sand, Ordovician 1709-76 feet, ¼-inch, 42-gravity, TD 1850.

Greer County, Lake Creek, North field. Reco Oil Co.'s Martin 1, NE NE NE 38-7n-21w, flowed 37 barrels from Granite Wash, Pennsylvanian 1229-32 feet, ¼-inch, TD 1318.

Kay County. Coon Construction Co.'s Maria Christina 2, SE NE NW 11-26n-4e, pumped 8 barrels oil and 2 barrels water from Pure sand, Pennsylvanian 2960-73 feet, 30-gravity, TD 3034.

Unnamed field. C. L. Carlock's Boxley 1, NE NE NE 36-27n-4e, Old Well Worked Over, flowed 480 barrels from Skinner sand, Pennsylvanian 2992-3000 feet, ¾-inch, 38-gravity, TD 3241.

Owens, West field. Taylor et al's Crews 1, NW NE SE 31-25n-2w, Old Well Drilled Deeper, flowed 26 barrels from Mississippi Chat, Mississippian 4567-89 feet, TD 5271.

Payne County, Stillwater Airport, North field. J. D. Wrather, Jr.'s Laughlin 2, NW NE NE 29-20n-2e, flowed 468 barrels oil and 40 barrels water from Cleveland sand, Pennsylvanian 3720-30 feet, 20/64-inch, 36-gravity, TD 4834.

Washita County. Woodward & Co.'s Dunlap 1, C NE SW 31-8n-16w, pumped 18 barrels from Springer sand, Pennsylvanian 4030-4110 feet, TD 6510.

Woods County. Phillips' Sandra 1-A, C NW NW 8-26n-15w, pumped 3 barrels oil and 27 barrels water from Mississippi lime, Mississippian 5910-6010 feet, TD 7575.

OKLAHOMA—NEW OIL PAYS

Grady County, Bradley field. Phillips' Steve 1, C SE NE 35-5n-5w, flowed 384 barrels from 3rd Bromide sand, Ordovician 12,875-13,050 feet, ¼-inch, 48-gravity, TD 14,163.

Kay County, Mervine, South field. H. Waggoner's Lewis 1-A, NE NE NE 27-27n-3e, pumped 10 barrels from Lower Hoover sand, Pennsylvanian 1576-86 feet, 42-gravity, TD 1586.

Okfuskee County, Weleetka field. Jones, Shelburne & Pellow Oil's Fleming 1, NW NE SE 4-10n-11e, flowed 155 bar-

More than a mere pipe fitting!
catawissa
PERFECT SEAL
unions
give a 3 to 1
safety factor
PLUS
A PERFECT SEAL!
THERE'S A CATAWISSA PERFECT SEAL UNION FOR EVERY USE . . . ALL TEMPERATURES, ALL PRESSURES!
The full dependability of HOT FORGED STEEL is yours in a Catawissa Union (hot forged from solid steel bars) with several extra value features that are exclusive here at the UNION SPECIALISTS!
All Catawissa Unions are designed to give a 3-to-1 SAFETY FACTOR . . . 3,000-lb. service unions are tested to 9,000-lbs., 6,000-lb. service unions tested to 18,000-lbs., etc.
Exclusive Ball-to-Angle seat design assures a PERFECT SEAL even when the pipe is not in alignment!
Machining operations assure a UNIFORMITY AND ACCURACY heretofore found only in special fittings and, with rigid inspection both during and after machining, guarantees LEAKPROOF CONSTRUCTION!
Satisfaction is guaranteed in any application—whether it be general low pressure service or extremely high pressures and temperatures (for air, oil, gas, chemicals, hot oils, gases or steam).
WRITE FOR CATALOG 11
AVAILABLE FROM LEADING INDUSTRIAL SUPPLY FIRMS
CATAWISSA VALVE & FITTINGS COMPANY
60 MILL ST. ★ CATAWISSA, PENNA.

(For more data on advertised products, use Readers' Service blue cards, last page this issue.)

rels from Wilcox sand, Ordovician 3675-97 feet, ½-inch, 42-gravity, TD 3697.

OKLAHOMA—OIL FIELD EXTENSIONS

Carter County, Brock field. W. F. Turner's Louise S. Schaff 1, SE SW SE 6-5s-1e, ¾-mile west extension, pumped 5 barrels oil from Deese sand, Pennsylvanian 3476-3544 feet, 20.4-gravity, TD 3833.

Garvin County, Bradley, Southeast field. Magnolia's Johnson Hogue Unit 1, C NE SW 18-4n-4w, flowed 173 barrels from Hart sand, Pennsylvanian 8669-8787 feet, ⅜-inch, 38-gravity, TD 10,195.

Hughes County, Holdenville, North field. D. W. Taylor's Witty 1, NE NE SE 31-8n-9e, pumped 130 barrels from Booch sand, Pennsylvanian 2782-2810 feet, 38-gravity, TD 2840.

Lincoln County, Wellston field. Robert A. Hefner, Jr.'s Mabee 1, SE SE NE 23-14n-2e, ½-mile south extension, flowed 192 barrels from Cleveland sand, Pennsylvanian 3746-56 feet, 30/64-inch, 52-gravity, TD 5264.

Logan County, Lawrie, West field. Falcon-Seaboard Drilling Co.'s Hettie Mills 1, SE SE SW 3-17n-3w, flowed 1960 barrels from Wilcox sand, Ordovician 6115-25 feet, ¼-inch, TD 6200.

Osage County, Herd field. Simon Lebow's Osage 1, SE SE SE 21-28n-10e, ½-mile west extension, flowed 240 barrels from Mississippi lime, Mississippian 1843-63 feet, 38-gravity, TD 1863.

KING 40-XV & 50-XV SWIVELS

FINEST IN THE FIELD

A swivel for drilling medium depth oil wells, deeper water wells, workover rigs, slim hole drilling and "drilling in" oil wells by the reverse circulation method.

Check these features of the 40-XV and 50-XV King Type Swivel:

OVERSIZED WATER COURSES assure larger fluid volume.

MOLDED RUBBER PACKINGS eliminate stuffing boxes.

HARDENED WEAR BUSHINGS eliminate wash pipes.

THE PACKING AND WEAR-BUSHINGS can be renewed within a very few minutes without removing any other part from the swivel.

ANGULAR CONTACT BALL BEARINGS provide ample thrust capacity and insure radial stability.

ALLOY STEEL CONSTRUCTION assures safety with minimum weight.

CLOSED HOUSING PROTECTS BEARINGS.

Export:

R. S. STOKVIS & SONS
17 Battery Place
New York 4, N. Y.

See your latest Composite Catalog for information on other King products.

KING OIL TOOLS

210 TERMINAL ST. • HOUSTON 20, TEXAS • OSage 3-3421

OKLAHOMA—NEW GAS FIELDS

LeFlore County. LeFlore County Gas & Electric Co.'s Frank Parnell 1, NW SE 18-9n-27e, flowed 10.0 million from Spiro sand, Pennsylvanian 6206-6308 feet, TD 6435.

Lincoln County, Chandler, North field. Tom Palmer, Inc.'s Marshall 1, SE SE NE 28-15n-14e, Old Well Drilled Deeper, flowed 3.5 million from Lower Skinner sand, Pennsylvanian 4120-5 feet, TD 4276.

TEXAS—DISTRICT 1—NEW OIL FIELDS

Atascosa County, "North Crown-Navarro" field. Harrell & Southworth's Faustino Munoz 1, Henry H. Wood Survey, pumped 10 barrels oil and 1 barrel water from Navarro-Olmos "B" sand, Upper Cretaceous 4030-58 feet, 42-gravity, completed 7-1-54, TD 4109.

Guadalupe County. Harry Henderson's Frank Schmidt 1, M. Miller Survey 34, flowed 193 barrels from Buda lime, Lower Cretaceous 2070-2103 feet, ¼-inch, 21-gravity, completed 9-29-54, TD 2237.

McMullen County, "Clark" field. T. O. Clark et al's Florence Martin 1, H. L. Williams Survey 18, pumped 16 barrels oil and 8 barrels water from 654-6 feet, 21-gravity, completed 9-12-54, TD 685.

TEXAS—DISTRICT 1— NEW OIL PAY

LaSalle County, Los Angeles field. Henderson Coquat's B. F. Perrow 1, I&GN Survey 40, flowed 17 barrels from 3579-81 feet, ¼-inch, 38.1-gravity, completed 9-18-54, TD 3620.

TEXAS—DISTRICT 2—NEW OIL PAY

Victoria County, Placedo, East field. Stanolind's Vandenberge & Hill 19, Eugenio Benavides Survey, Old Well Worked Over, flowed 96 barrels from Frio sand, Oligocene 6588-90 feet, 11/64-inch, 40.4-gravity, completed 9-15-54, TD 6889.

TEXAS— DISTRICT 2—NEW DISTILLATE FIELDS

Frio County, "Boyce, North" field. H. H. Howell-Edwin L. Cox-Harry J. Parker's A. M. Albrecht 2, V. Ramos Survey, flowed 30 barrels distillate and 5.0 million from Pettus sand, Eocene 4174-77 feet, open, 64.7-gravity, completed 9-21-54, TD 4930.

Goliad County. Kirkwood & Co.'s Phillip Fuchs Estate 1, Abel Sigmon Survey, flowed 875 barrels distillate and 35.0 million from Massive Wilcox sand, Eocene 8767-88 feet, 12/64-inch, 53.2-gravity, completed 9-2-54, TD 9120.

Lavaca County. Union Producing Co.'s Borchers 1-C, R. Williams Survey, flowed 43 barrels distillate and 1.8 million from 8525- feet, 58-gravity, completed 8-23-54, TD 14,420.

TEXAS—DISTRICT 2—NEW GAS PAY

DeWitt County, Meyersville, East field. Continental Oil Co.'s Edwina Hausman 1, Thomas H. Bell Survey, flowed 1.7 million from Frio sand, Oligocene 3000-8 feet, completed 8-23-54, TD 8798.

TEXAS—DISTRICT 3—NEW OIL FIELD

Waller County, Brookshire Dome area. Humble's Sam T. Jones 1, William Cooper Survey, flowed 31 barrels from 6842-86 feet, ⅛-inch, 30.5-gravity, completed 8-28-54, TD 8165.

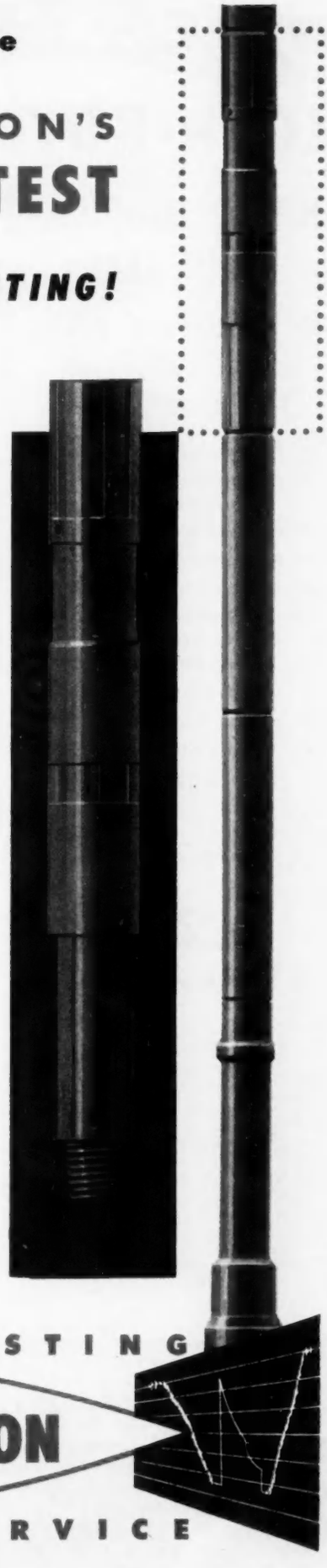
TEXAS—DISTRICT 3—NEW OIL PAYS

Liberty County, Hankamer (North Flank)

perfect runs with perfected tools make

HALLIBURTON'S HYDRO-SPRING TEST

FIRST and BEST in DRILL STEM TESTING!



The most successful test on your well starts with your call for Halliburton's Hydro-Spring Test—the formation test that sets year-to-year records for perfect runs, fast and complete service and perfected tools. These are the performance features that make Halliburton first choice with most operators everywhere ... check these important firsts and you'll know why Halliburton holds the important top spot with the most accurate, modern and complete service:

- **FIRST** with hydraulic testing—Halliburton's Hydro-Spring Tester.
- **FIRST** with most accurate pressure recording—Halliburton's Bourdon Tube Device.
- **FIRST** with new instant release packer—Halliburton's Expanding Shoe Packer.
- **FIRST** in number of perfect runs—Halliburton's Hydro-Spring sets records for successful tests.
- **FIRST** in minutes-away availability—Halliburton's 211 camps in this country alone.
- **FIRST** in testing research and development—Halliburton's 30-year record of intensive research.
- **FIRST** in experience—Halliburton's experience on more than 2 million jobs.
- **FIRST** in testing—Halliburton's first choice with majority of operators.

Like most operators, make Hydro-Spring your first thought for formation testing—because being first and best is a Halliburton tradition that started more than thirty years ago. Get all the facts on Halliburton's success and you'll know why the swing is to Hydro-Spring—the *best* for *your* drill stem test. Call your local or district Halliburton office. Or contact Halliburton Oil Well Cementing Company, Duncan, Oklahoma.

Hydro-Spring Tester—Patent Applied For

TESTING

HALLIBURTON

SERVICE

"HALLIBURTON'S BEST FOR YOUR DRILL STEM TEST"

JET-LUBE

KOPR-KOTE

(U.S. Pat. No. 2,543,741)

THREAD LUBRICANT AND SEAL

for Casing and Tubing, Drill Collar and Tool Joint Threads

- for precision cut threads
- perfect seal, prevents washouts
- anti-seize, prevents galling
- full makeup, easy breakout
- withstands high pressure & temperature
- perfect thread and shoulder contact
- will not pack or work harden
- perfect matrix for damming
- will not separate
- corrosion and rust inhibitor

Contains pure metallic lead and copper flake.

JET-LUBE

APPLICATOR

For applying lubricants faster without hand brushing. Prevents lube contamination. Reduces consumption. Insures clean lube. Saves time, equipment.

Order from your supply house or send for Technical Bulletin

JET-LUBE INC.

3093 No. California St., Burbank, Calif.

Export Office

30 Rockefeller Plaza, New York 20, N. Y.

Canadian Licensee

Jet-Lube of Canada Ltd., Edmonton, Alberta

field. Dan J. Harrison, Jr.'s D. J. Harrison Jr. "A" Fee 9, B&TC RR Survey 3, Old Well Worked Over, flowed 149 barrels from 3626-32 feet, 10/64-inch, 24.5-gravity, completed 9-14-54, TD 4105.

Matagorda County, Arch field. Kilroy Co. of Texas, Inc.'s Ruth B. White 1, I&GN Survey, flowed 179 barrels from Middle Frio sand, Oligocene 685-88 feet, 10/64-inch, 28.5-gravity, completed 9-5-54, TD 8599.

Wadsworth field. Magnolia's Ethel Cornelius 8, Jonathan C. Peyton Survey, flowed 370 barrels from Frio sand, Oligocene 10,282-9 feet, 18/64-inch, 49.5-gravity, completed 9-11-54, TD 12,516.

TEXAS—DISTRICT 3—OIL FIELD EXTENSION

Brazoria County, West Columbia field. Charles B. Wrightsman's A. P. George 2, George Tennille Survey, ¾-mile north extension, flowed 222 barrels from Frio sand, Oligocene 10,366-80 feet, 12/64-inch, 51.5-gravity, completed 9-29-54, TD 11,005.

TEXAS—DISTRICT 3—NEW DISTILLATE FIELDS

Galveston County. Superior's Cooper Unit 1, Block 61, I&GN RR Co. Survey 13, flowed 630 barrels distillate and 9.4 million from Algoa #48 (Frio) sand, Oligocene 11,659-65 and 11-686-94 feet, 41.8-gravity, completed 9-25-54, TD 11,976.

Harris County. C. B. Webster's G. S Hinkle Estate 2, William Hierronymus Survey, flowed 187 barrels distillate and 17.0 million from 1st Cockfield sand, Eocene 5811-4 feet, open, completed 8-17-54, TD 7235.

Huffsmith area. Christie, Mitchell & Mitchell's Crystal C. Krezdorn 1, J. S. Smith Survey, flowed 5 barrels distillate and 0.5 million from Cockfield sand, Eocene 5479-89 feet, 8/64-inch, completed 9-18-54, TD 6805.

Matagorda County. Fidelity Oil & Royalty Co. & Natural Gas Production Co.'s Mrs. Clarence Doman et al 2, Henry Harrison Survey, ungauged from 10,631-7 feet, completed 9-9-54. TD 11,034.

Newton County, "Call, East" field. Houston Oil Co. & American Republic Corp.'s Earl C. Hankamer et al's 1-C, J. D. Ray Survey, ungauged from 4th Yegua sand, Eocene 7502-6 feet, completed 8-28-54, TD 8300.

TEXAS—DISTRICT 3—NEW DISTILLATE PAYS

Hardin County, Silsbee, North field. American Republics & Houston Oil's James Rafferty Fee 2, James Rafferty League, flowed 466 barrels distillate and 14.9 million from Yegua sand, Eocene 6414-8 feet, open, 64.6-gravity, completed 9-3-54, TD 7626.

Silsbee, West field. American Republics & Houston Oil's E. P. Elliott Fee 5, E. P. Elliott League, flowed 490 barrels distillate and 8.5 million from "Z" sand, Eocene 7939-43 feet, 59.5-gravity, completed 9-5-54, TD 7996.

Sour Lake field. Humble's Humble-J. W. Parr Fee 2, HT&B RR Survey, Block 72, flowed 12 barrels distillate and 3.4 million from Lower Cockfield sand, Eocene 9625-48 and 9659-82 feet, 39.5-gravity, completed 8-24-54, TD 9690.

TEXAS—DISTRICT 3—NEW GAS PAY

Harris County, Humble field. Starr O&G Co.'s Bender Estate 1, Wherry B. Adams Survey, flowed 9.8 million from Frio sand, Oligocene 2741-4 feet, completed 9-10-54, TD 3510.

TEXAS—DISTRICT 3—GAS FIELD EXTENSION

Wharton County, Magnet-Withers field. Smith & Smith's Blue Creek Ranch Co. 1, Block 9, K. L. Ranch Subdivision, ½-mile southeast extension, flowed 94.0 million from Frio sand, Oligocene 4274-84 feet, open, completed 9-26-54, TD 4367.

TEXAS—DISTRICT 4—NEW OIL FIELDS

Kenedy County "Zorilla" field. Humble's Charles M. Armstrong (Armstrong Ranch) 4, "Barreta" Jose Francisco Balli Grant, flowed 38 barrels oil and 3 barrels water from 7655-67 feet, ⅛-inch, 35.9-gravity, completed 9-14-54, TD 12,123.

San Patricio County, "Luther" field. H. H. Howell & William H. Winn's J. W. Luther et al 2, Ed J. McGloin Survey, Lot 12, flowed 57 barrels oil and 22 barrels water from Vicksburg (Pundt) sand, Oligocene 4217-20 feet, ⅛-inch, 22.8-gravity, completed 9-11-54, TD 4238.

Willacy County, "Willimar South" field. Shell Oil Co.'s J. D. Campbell 1, Share 5, San Juan de Carricitos Survey, pumped 15 barrels oil and 7 barrels water from Frio sand, Oligocene 8006-10 feet, 30-gravity, completed 9-10-54, TD 8504.

TEXAS—DISTRICT 4—NEW OIL PAYS

Aransas County, West Rockport field. Heep Oil Corp. et al's Zeph Rouquette et al 2, J. G. Smith Survey, flowed 251 barrels oil and 13 barrels water from Frio sand, Oligocene 8831-4 feet, 10/64-inch, 42-gravity, completed 9-10-54, TD 9190.

Duval County, Peters, East field. Dale & Ralph Rowden's John P. Akin State of Texas 3, F. E. Stearns Survey, pumped 35 barrels oil and 18 barrels water from Jackson sand, Eocene 2352-8 feet, 25.7-gravity, completed 9-15-54, TD 2416.

Jim Wells County, Alice, West field. Southwest Workover Co.'s W. R. Perkins, Jr., 2, La Vaca Grant, flowed 147 barrels from Vicksburg sand, Oligocene 5144-52 feet, ⅛-inch, 45.5-gravity, completed 9-28-54, TD 5515.

Captain Lucy field. Lyman-Damascus Operations' Fred Erch 1-B, Richard King Farm Tracts, NW ¼ Section 15, flowed 83 barrels oil and 8 barrels water, from Vicksburg sand, Oligocene 5977-80 feet, 7/64-inch, 41.1-gravity, completed 9-9-54, TD 6348.

Webb County, Aguilares field. Skelly Oil Co.'s J. C. Martin 1-C, C&M Survey 476, flowed 140 barrels oil and 15 barrels water from Wilcox sand, Eocene 6463-80 feet, 5/32-inch, 34.9-gravity, completed 9-15-54, TD 7000.

Bruni field. Hill & Dugger's A. M. Bruni Estate 1, Mariano Arispe Grant, Share 2, J. R. Foltz Subdivision, Section 7, flowed 141 barrels oil and 25 barrels water from Queen City sand, Eocene 5639-44 feet, 36.7-gravity, completed 9-21-54, TD 6124.

Willacy County, La Sara field. The Superior Oil Co.'s Yturria Cattle Co. 3, San Juan de Carricitos Grant, flowed 121 barrels from Frio sand, Oligocene 6526-32 feet, 9/64-inch, 42-gravity, completed 9-9-54, TD 7600.

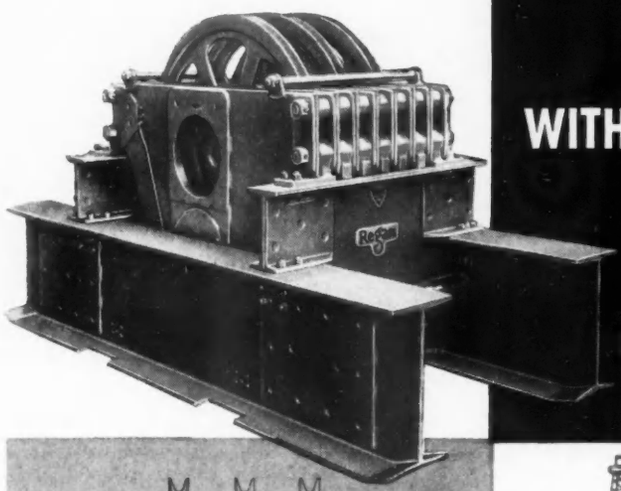
CROWN AND TRAVELING BLOCKS BY

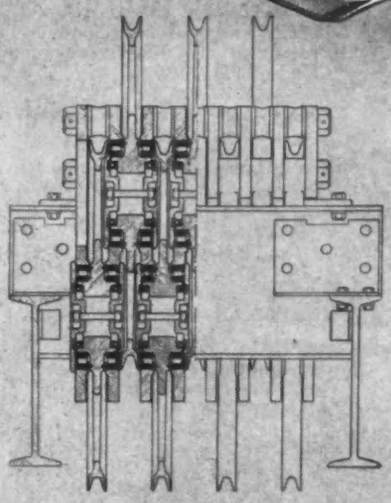
Regan Forge & Engineering Co.

WITH BALL AND ROLLER BEARINGS BY

Aetna

ENGINEERED TO MEET TODAY'S FASTER, DEEPER DRILLING NEEDS





MOUNTING ARRANGEMENT of Aetna radial roller and ball thrust bearings in Regan's AN 55, seven-sheave, 600 ton capacity crown block. Roller bearings have complement of 28—1¼" dia. x 1½" long rollers; radial load capacity of 115,700 lbs. @ 10 R.P.M.—38,570 lbs. @ 270 R.P.M. Thrust bearings have laminated phenolic retainers with 28—¾" balls; thrust load capacity of 50,270 lbs. @ 10 R.P.M.—16,750 lbs. @ 270 R.P.M.

The Regan Forge and Engineering Company's model AN 55 Crown and Traveling Blocks were designed specifically to handle the increased wire line speeds of today's larger, more powerful drawworks.

With special Aetna ROLLER bearings carrying the radial loads and special Aetna BALL bearings protecting the sheaves from thrust load drag, the advanced Regan design provides the fastest falling traveling block made.

For oilmen, Regan blocks with Aetna bearings is a combination that means faster completion of wells, less downtime, longer block life expectancy and lower maintenance costs.

Because drilling is an increasingly rugged business, calling for tougher, better, faster, unfailing operating equipment, more and more oil country equipment manufacturers are finding that it pays to team up with Aetna products and Aetna's engineering-manufacturing know-how and forward thinking. When YOU have equipment in the design stage why not consult us. You might find it the quickest, easiest way to assure finished products of better quality, superior performance and greater saleability.

AETNA BALL AND ROLLER BEARING COMPANY

DIVISION OF PARKERSBURG-AETNA CORPORATION

4600 Schubert Avenue • Chicago 39, Illinois

Standard and Special Ball Thrust Bearings • Angular Contact Ball Bearings • Special Roller Bearings • Ball Retainers • Hardened and Ground Washers • Sleeves • Bushings • Miscellaneous Precision Parts.

Host to the

Nation

The AFFILIATED NATIONAL HOTELS

Serving 20 cities in 8 states

and the District of Columbia

AIR CONDITIONED COMFORTABLE GUEST ROOMS

•

SUPERB CONVENTION FACILITIES

•

EXCELLENT FOOD

•

TELEVISION AND RADIOS

•

COURTEOUS SERVICE

★

Carry a Universal Credit Card — It's Convenient and Safe.

Write the NATIONAL HOTEL COMPANY
P. O. Box 59
Galveston, Texas

AFFILIATED NATIONAL HOTELS

ALABAMA
HOTEL ADMIRAL SEMMES — Mobile
HOTEL THOMAS JEFFERSON — Birmingham
DISTRICT OF COLUMBIA
HOTEL WASHINGTON — Washington
INDIANA
HOTEL CLAYPOOL — Indianapolis
LOUISIANA
JUNG HOTEL — New Orleans
HOTEL DESOTO — New Orleans
NEBRASKA
HOTEL PAXTON — Omaha
NEW MEXICO
HOTEL CLOVIS — Clovis
SOUTH CAROLINA
HOTEL WADE HAMPTON — Columbia
TEXAS
HOTEL STEPHEN F. AUSTIN — Austin
HOTEL EDISON — Beaumont
HOTEL BROWNWOOD — Brownwood
HOTEL BAKER — Dallas
HOTEL TRAVIS — Dallas
HOTEL CORTEZ — El Paso
HOTEL BUCCANEER — Galveston
HOTEL GALVEZ — Galveston
HOTEL JEAN LAFITTE — Galveston
CORONADO COURTS — Galveston
HOTEL PLAZA — Laredo
HOTEL LUBBOCK — Lubbock
HOTEL FALLS — Marlin
HOTEL CACTUS — San Angelo
HOTEL MENGER — San Antonio
ANGELES COURTS — San Antonio
VIRGINIA
HOTEL MOUNTAIN LAKE — Mountain Lake
HOTEL MONTICELLO — Norfolk
TELEPHONES
NEW YORK—Murray Hill 6-6990 — CHICAGO—Hubbard 6-6100
WASHINGTON—Executive 3-6651 — MEXICO CITY—18-4800 — GALVESTON—5-5236
AIR CONDITIONED • TELEVISION • RADIOS

TEXAS—DISTRICT 4—NEW DISTILLATE FIELDS

Brooks County. Bass & Vessels' S. B. Chamberlain 1, Burton & Danforth Subdivision, flowed 370 barrels distillate and 8.4 million from Frio sand, Oligocene 7806-16 feet, 61.7-gravity, completed 6-25-54, TD 8900.

Kenedy County, "Candelaria" field. Humble's Charles M. Armstrong 5, "Barreta" Jose Francisco Balli Grant, flowed 174 barrels distillate and 2.7 million from Frio sand, Oligocene 11,190-202 feet, 48.2-gravity, completed 8-15-54, TD 12,202.

TEXAS—DISTRICT 4—NEW DISTILLATE PAY

Hidalgo County, San Salvador field. Magnolia's Santa Cruz-Hendrix Unit 1, Santa Cruz Ranch Subdivision, flowed 4 barrels distillate and 3.0 million from 9150-9, 9192-8, and 9205-14 feet, 43.1-gravity, completed 9-1-54, TD 9700.

TEXAS—DISTRICT 4—DISTILLATE FIELD EXTENSION

Nueces County, Minnie Bock, North field. Edwin L. Cox's Lee M. Dugger 1, George H. Paul Subdivision, Driscoll Ranch, Section 63, ¾-mile west extension, flowed 2.0 million from Frio sand, Oligocene 5802-7 and 5816-20 feet, open, and 786 barrels distillate and 36.0 million from Frio sand, Oligocene 6921-52 feet, open, 57.2-gravity, completed 8-25-54, TD 7178.

TEXAS—DISTRICT 6—NEW DISTILLATE FIELD

Anderson County, South Slocum Area. Christie, Mitchell & Mitchell Co.'s Nora Langston 1, W. T. Saddler Survey, flowed 20 barrels distillate and 1.0 million from Woodbine sand, Upper Cretaceous 5961-3 feet, $^{11}/_{64}$-inch, completed 9-20-54, TD 5966.

TEXAS—DISTRICT 7-B—NEW OIL FIELDS

Coke County, F. Kirk Johnson's Nora Gee 1, Section 120, Block 2, H&TC Survey, Old Well Worked Over, flowed 638 barrels from Strawn sand, Pennsylvanian 6756-6818 feet, $^{24}/_{64}$-inch, 45.2-gravity, completed 9-11-54, TD 7110.

Unnamed field. Sun's D. M. Millican 1, Section 461, Block 1-A, H&TC Survey, pumped 53 barrels oil and 35 barrels water from Caddo lime, Pennsylvanian 6557-60 feet, 39.3-gravity, completed 9-9-54, TD 7830.

Crockett County. Pan American Production Co.'s University "M-40426" 1, Section 28, Block 38, University Lands Survey, flowed 7 barrels oil and 5 barrels water from Ellenburger lime, Ordovician 8174-86 feet, ½-inch, 59-gravity, completed 9-22-54, TD 9051.

Menard County. Tucker Drilling Co.'s Mary E. Rogers 1, Section 5, Block B, GH&SA Survey, pumped 178 barrels from Cisco sand, Pennsylvanian 2801-24 feet, 2-inch, 42.7-gravity, completed 8-19-54, TD 2824.

Reagan County. Phillips' University 1-C, Section 5, Block 9, University Lands Survey, flowed 221 barrels from Bend lime, Pennsylvanian 10,460-90 feet, ½-inch, 54-gravity, completed 7-7-54, TD 11,870.

Runnels County. Service Drilling Co.'s J. B. McCord 1, Section 320, G. W. Bailey Survey, flowed 245 barrels from Crosscut sand, Pennsylvanian 3309-19 feet, $^{20}/_{64}$-inch, 43-gravity, completed 9-2-54, TD 3979.

Sanford field. Gulf Oil Corp.'s J. O. Sanford 1, L. Forsythe Survey 450, flowed 426 barrels from Fry sand, Pennsylvanian 4516-29 feet, ½-inch, 40.6-gravity, completed 9-16-54, TD 4570.

TEXAS—DISTRICT 7-C—NEW OIL PAYS

Crockett County, Tippett, East field. Bankline Oil Co. & Hurt Oil Co., Ltd.'s J. H. Tippett 1-42, Section 42, Block 31, H&TC Survey, flowed 64 barrels from Clearfork lime, Permian 4505-26 feet, 1-inch, 36-gravity, completed 9-13-54, TD 6174.

Runnels County, Ashton field. Hickok & Reynolds, Inc.'s Clara Ashton 1, Section 262, Austin & Williams Survey, pumped 85 barrels oil and 13 barrels water from Dog Bend lime, Pennsylvanian 3475-86 feet, 45-gravity, completed 9-3-54, TD 3862.

TEXAS—DISTRICT 7-C—OIL FIELD EXTENSION

Crockett County, Todd, East field. Humble's Shannon 1-B, Section 58, Block UV, GC&SF Survey, ¾-mile east extension, flowed 205 barrels oil and 3 barrels water from Ellenburger lime, Ordovician 7118-80 feet, completed 8-28-54, TD 7485.

TEXAS—DISTRICT 7-C—NEW GAS FIELD

Sutton County. Ada Oil Co.'s Rip Ward 1, Section 92, Block B, HE&WT Survey, flowed 3.0 million from Canyon sand, Pennsylvanian 5369-79 and 5420-68 feet, 2-inch, completed 8-13-54, TD 7468.

TEXAS—DISTRICT 7-C—NEW GAS PAY

Sutton County, Mittle field. Sinclair O&G Co.'s Christena Mittel 1, Section 121, Block A, HE&WT Survey, flowed 0.3 million from Canyon sand, Pennsylvanian, 5848-58 and 5875-85 feet, 2-inch, completed 6-24-54, TD 7417.

TEXAS—DISTRICT 7-C—GAS FIELD EXTENSION

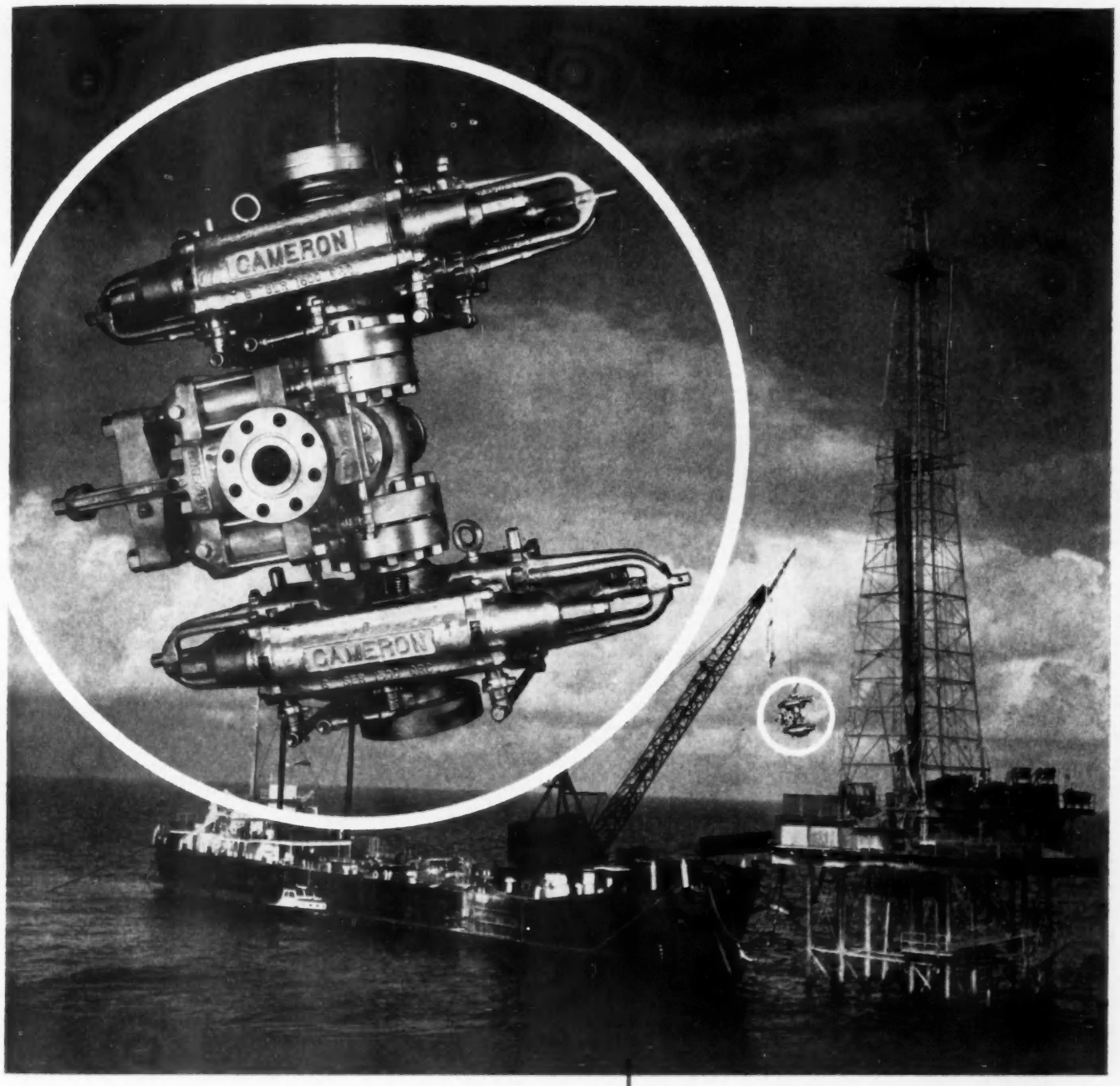
Sutton County, Senora field. Sinclair's Thompson Heirs 1, Section 63, Block A, HE&WT Survey, 2-mile northeast extension, flowed 4.1 million from Canyon sand, Pennsylvanian 5390-5420 and 5460-5535 feet, completed 5-10-54, TD 5700.

TEXAS—DISTRICT 8—NEW OIL FIELDS

Borden County. Phillips' Quartz 1, Section 15, Block 33, T-4-N, T&P Survey, flowed 864 barrels oil and 121 barrels water from Spraberry sand, Permian 7200-50 and 7268-7346 feet, $^{32}/_{64}$-inch, 35.6-gravity, completed 7-26-54, TD 8555.

Terry County. Anderson-Prichard Oil Corp., Fred Goodstein & Woodson Oil Co.'s Oil Development Co. 1, Section 152, Block D-11, J. H. Gibson Survey, flowed 509 barrels from Devonian lime 12,763-78 feet, ¾-inch, 34.3-gravity, completed 9-8-54, TD 12,797.

Yoakum County. Hunt Oil Co.'s W. M. Johnson et al 1, Section 644, Block D, John H. Gibson Survey, flowed 317 barrels oil and 32 barrels water from Devonian lime 11,438-75 feet, ¼-inch, 37.1-gravity, completed 8-23-54, TD 11,553.



QRCs OFFSHORE

Offshore operations require the best in drilling control equipment and skilled personnel. Cameron QRC Blowout Preventers, the HCR Flowline Valve, and safety-conscious operators are the Industry's most dependable drilling control team.

★ ★ ★

The name "Cameron" has been synonymous with "blowout preventers" for nearly 35 years.

Cameron

IRON WORKS, INC.

VALVE AND OIL TOOL DIVISION
P. O. Box 1212, Houston, Texas

Export Office: 7912 Empire State Bldg., New York City • In England: British Oilfield Equipment Co., Ltd., Duke's Court, St. James's, London, S.W. 1, England.

TEXAS—DISTRICT 8—NEW OIL PAYS

Andrews County, C-Ranch field. Magnolia's Fasken Block 1-CA, Section 30, Block 40, T-3-N, G&MMB&A Survey, Old Well Worked Over, pumped 15 barrels from Wolfcamp lime, Permian 10,008-38 feet, 37-gravity, completed 8-25-54, TD 12,883.

Emma field. Husky Oil Co.'s Emma Cowden 2, Section 1, Block 44, T-2-N, T&P Survey, flowed 352 barrels from Fusselman lime, Silurian 11,329-43 and 11,354-68 feet, ¾-inch, 46-4-gravity, completed 8-20-54, TD 12,556.

Hockley County, Caluene field. Sunray Oil Corp.'s C. T. Pace 1, Baylor CSL Survey, Old Well Worked Over, pumped 35 barrels oil and 65 barrels water from San Andres lime, Permian 5093-5146 feet, 31-gravity, completed 9-9-53, TD 7572.

Yoakum County, Wasson field. Texas Pacific Coal & Oil Co.'s Ruth Bennett Acct 2 "E" 55, Section 694, Block D, John H. Gibson Survey, pumped 156 barrels from Clear Fork lime, Permian 7800-70 feet, 24/64-inch, 30.1-gravity, completed 9-7-54, TD 10,215.

TEXAS—DISTRICT 8—OIL FIELD EXTENSIONS

Andrews County, Means field. Vest, Dorbandt & Ross's H. C. McQuatters, Trustee 2-B, Section 20, Block A-34, PSL Survey, ½-mile northwest extension, flowed 146 barrels from Queen sand, Permian 4187-4206 feet, 12/64-inch, 32.2-gravity, completed 9-1-54, TD 4240.

Garza County, Justiceburg field. Cecil Oil Corp. et al's J. S. Reed 1-A, Section 117, Block 5, H&GN Survey, ½-mile east extension, pumped 152 barrels oil and 38 barrels water from Glorieta lime, Permian 2554-64 feet, 37.4-gravity, completed 9-14-54, TD 2569.

Midland County, Headlee field. British American Oil Producing Co., Seaboard Oil Co., Austral Oil Exploration Co., Inc.'s Roy Parks, Jr., Estate 1, Section 28, Block 41, T-2-S-T&P Survey, 1½-mile south extension, flowed 740 barrels from Ellenburger lime, Ordovician 13,044-182 feet, 14/64-inch, 55.3-gravity, completed 8-27-54, TD 13,350.

Yoakum County, Jones Ranch field. Amerada Petroleum Corp.'s Edward Randall 1, Section 853, Block D, J. H. Gibson Survey, ½-mile west extension, flowed 537 barrels from Wichita-Albany lime, Permian 8910-72 feet, 20/64-inch, 40.4-gravity, completed 9-8-54, TD 9020.

TEXAS—DISTRICT 10—NEW OIL FIELDS

Gray County. Phillips' Delp 1, Section 110, Block M-2, BS&F Survey, flowed 257 barrels from Granite Wash, Pennsylvanian 9558-69 feet, ¼-inch, 43.6-gravity, completed 9-8-54, TD 9569.

Hartley County. Standard Oil Co., of Texas' Ernest Guilloud 1, Section 54, Block LE, G&M Survey, pumped 38 barrels oil and 3 barrels water from Granite Wash, Pennsylvanian 6164-86 feet, 42-gravity, completed 9-23-54, TD 7454.

TEXAS—DISTRICT 10—OIL FIELD EXTENSION

Hansford County, Gruver, East field. Humble's H. L. Wilbanks et ux 1, Section 120, Block 45, H&TC Survey, 2-mile south extension, pumped 6 barrels from Strawn lime, Pennsylvanian 5975-88 feet, 40-gravity, completed 6-25-54, TD 6300.

WYOMING—NEW OIL FIELDS

Fremont County, Happy Springs field. Sinclair's Jade Unit 3, SE SW 3-28n-93w, 1-mile west extension, pumped 290 barrels from 4th Frontier sand, Upper Cretaceous 3769-97 feet, 35.7-gravity, completed 9-17-54, TD 3860.

Sheridan County, Decker area. Shell's Hullworth 1, SE NE NE 31-58n-84w, pumped 260 barrels from Ash Creek sand, Upper Cretaceous 4886-4902 and 4907-18 feet, completed 9-27-54, TD 4960.

WYOMING—NEW DISTILLATE PAY

Carbon County, Medicine Bow area. McElroy Ranch Co.-National G&O Co.-Bruce Anderson's Horne 3, NW NE SW 11-20n-79w, flowed 8.0 million from Sundance 5805-15 feet, completed 9-3-54, TD 5924.

WYOMING—NEW GAS FIELD

Sublette County. A. B. Belfer's Government 10-C, C SW NE 14-28n-113w, flowed 0.7 million from Almy sand, Eocene 3158-3219 feet, completed 6-15-54, TD 3586.

WYOMING—NEW GAS PAY

Sublette County, Big Piney field. Belco Petroleum Corp.'s Government 5-B, C E½ NW NW 35-29n-113w, flowed 18.7 million from Almy sand, Eocene 1072-1566 feet, completed 5-8-54, TD 1566.

WHEELING
COUPLINGS
FOR OIL COUNTRY USE
TOP QUALITY Since 1918
LINE PIPE COUPLINGS A.P.I.
⅛" to 12"—Seamless and Special Processed—Black or Galvanized
PLAIN TUBING COUPLINGS A.P.I.
1" to 4"—Seamless
EXTERNAL UPSET TUBING COUPLINGS A.P.I.
¾" to 3½"—Seamless
CASING COUPLINGS A.P.I.
4½" to 13⅜"—Long or Short
HYDRAULIC COUPLINGS
⅛" to 4"—Seamless
REAMED AND DRIFTED A.I.S.I.
¾" to 12"—Seamless or Special Processed
DRIVE PIPE COUPLINGS
⅜" to 12"—Seamless or Special Processed
Sales Offices in Leading Cities
Albany, N. Y.—Albert L. Becker, 434 Clinton Ave.
Baltimore, Md.—Ted Barto, 2301 N. Charles St.
Chicago, Ill.—Harry A. Jay, Suite 1090, Old Colony Bldg.
Denver, Colo.—Earl H. Jones & Co., 1863 Wazee St.
Detroit, Mich.—Thomas L. Osberger, 10226 Woodward Ave.
Erie, Pa.—R. J. Maggi, Box 711
Falmouth, Mass.—Walter S. Bennett, 53 Minot St.
Houston, Tex.—Henry H. Paris Distributor, Inc., Box 932
Los Angeles, Cal.—James A. Riordan Co., 1400 Santa Fe Ave
Milwaukee, Wisconsin—M. A. Nelson Co., 3530 N. 41st St.
Minneapolis, Minn.—Lin J. Krause, 5605 Lyndale Ave. S.
Narberth, Pa.—I. W. Worthington, 105 Forrest Ave.
Newark, N. J.—Ira L. Rothenberg & Assocs., 69 Lincoln Park
New York, N. Y.—Henry Stein, 50 Cliff St.
Portland, Ore.—Earl H. Jones & Co., 1233 NW 12th Ave.
Richmond, Va.—P. C. Abbott & Co., 15 E. Franklin St.
St. Louis, Mo.—Mike A. Boyle, 1112-18 Hamilton Ave.
San Francisco, Cal.—Earl H. Jones & Co., 1150 Folsom St.
Seattle, Wash.—Earl H. Jones & Co., 819 Thomas St.
WHEELING MACHINE PRODUCTS COMPANY
WHEELING, WEST VIRGINIA
Factories at WHEELING, W. VA. and WOODLAKE, CALIFORNIA

ONE GOOD WAY to catch cuttings is to let them fall from shale shaker screen onto board.

How to Catch Well Samples

More reliable geological data are yours at no extra expense if careful attention is given to catching and handling well cuttings.

GOOD WELL cuttings are the most important tool of the paleontologist. Regardless of the individual's ability, the results are no better than the samples on which his work is based.

To be worthwhile, logging of *any* type must be complete and thorough. If an electric log, for instance, recorded only permeability for the first several thousand feet only resistivity for the next several thousand feet, and nothing at all for the remainder of the hole, it is obvious that time spent on such a log would be wasted effort. The paleontologist's work on poor samples falls in exactly the same category, with companies actually losing money through wasted time and incorrect information.

Poor samples appear to be due to the lack of understanding on the part of those concerned with the catching of samples. An erroneous idea prevails that any material placed in a cloth bag constitutes a sample, even though it was taken from a slush pit. Great sport often is made about the samples caught. There is the standard joke about the roughneck catching all his samples at once when he comes on tour. It is no joking matter to a company bearing the expense of maintaining its own paleontological staff or employing a consulting paleontologist.

Since most drilling contracts contain a clause about catching samples, it is suggested that operators underscore that part of the contract and emphasize to the contractor that this is an essential part of his job.

The following rules will insure good samples: The first essential is a shale shaker, preferably the flat vibrating type. A wide board should be placed beneath the end of the shaker where the cuttings drop. When the required cutting interval has been attained, viz, 10 feet, 15 feet, or 30 feet, samples may be scooped off this board with a shovel. Cuttings should then be placed in a box with an area of one to one and one-half square feet. The bottom of this box should be screen. An abandoned shale shaker screen is highly desirable. If none is available, then ordinary window screen will suffice.

After samples have been placed in the box, run water over them with a hose, occasionally stirring cuttings with one hand until all sand and soluble material have been removed. This washing must be done at the well while the samples are wet. Once the shale dries out, it begins to disintegrate when wet again and the fine shale particles and the "bugs," which are microscopic in size, pass through the

BITS MAY CONTAIN important cuttings. A bit is washed in a steel bucket and samples removed with a strainer.

IF SHALE SHAKER IS BYPASSED, sample well cuttings can be taken from returning mud by means of small hand strainer.

screen. If the cuttings are not washed and stirred sufficiently and sand is retained in the sample it will usually result in a voluminous sample for the paleontologist to look through. The "bugs" are in the shales.

After sample is caught and washed, label *dry* sample bags with an indelible pencil, both on the bag itself and the tag provided. Place sample in bag to drain and dry. They may be placed near steam line on steam rig and near the exhaust on a power rig. Once dried, the sample should be placed in a sheltered spot and kept dry until sent to laboratory.

After sacking sample, take hose and wash the remaining cuttings from the board so that the next batch will be from the next cutting interval.

It is recommended that a large and a small bag of sample be taken, the large one to be eventually released to a cutting room and the small one for the company's own use.

It is further recommended that the samples be picked up at the rig often. The crews, seeing large amounts accumulating, feel that the samples are of no value and become careless in catching them.

In general, mud logging samples have not been found to be satisfactory for paleontologic use. However, if prior arrangements are made with the mud logging companies to collect larger samples and to follow the procedure outlined above, satisfactory samples may be obtained.

If for some reason a sample is missed, do not allow the roughneck to fill a bag with erroneous material to correct the error.

In the case of wire line or conventional coring, the crew should continue to catch cuttings as in normal drilling. The geologist or engineer supervising the coring should sack up a portion of each core for the paleontologist, preferably the shale portions.

Prior to running an electric log, most operators circulate to condition mud for a period of time sufficient to get returns off bottom. Just before pulling out of a hole, a sample should be caught, regardless of whether the cutting interval has been reached. This is often a critical sample.

In shipping samples that might be damp, place in a porous bag, not in a waterproof one that may cause mildew.

Mechanical sampling devices have been tried. However, the results obtained do not approach those of the method described above.

In case of lost circulation where the shaker is cut out and lost circulation material has been added, the following method may be used. Anchor a five-gallon bucket in the ditch. Remove bucket when about half full and fill with a hose, stirring material in bucket vigorously, causing the lost circulating material to rise to top. Float off lost circulating material and place remaining portion in sample washing box. Proceed as mentioned before.

Oil companies and operators can secure more reliable geological data at no additional expense by giving more attention to the catching and handling of samples.

ACKNOWLEDGMENT

This copyrighted report is presented through the courtesy of the Gulf Coast Section of the Society of Economic Paleontologists and Mineralogists. It was prepared by a special committee headed by Charles W. Stuckey, Jr., Union Oil Company of California, Houston.

—**The End**

Reprint on Slim Hole Drilling

A special reprint of the material from the May, July and August, 1954, issues of WORLD OIL dealing with the advantages and limitations of modern slim hole drilling is now available. Send your request with $1 to WORLD OIL, P. O. Box 2608, Houston, Texas.

How to Plan an Insurance Program

Here are three basic factors the drilling contractor should remember:

- **Shopping around for 'bargains' can be costly.**
- **Spreading policies among numerous agents leads to confusion.**
- **The 'fine print' in the policy can make the difference between coverage or no protection at all.**

By JOHN WAKEFIELD, Wakefield & Associates, Tulsa

INSURANCE IS A bugbear to most laymen and the drilling contractor is no exception. In a general way contractors realize their insurance premiums constitute a considerable portion of their drilling cost. But until a serious loss or claim arises, this phase of their business may receive little attention.

In planning his insurance program so that he may obtain adequate protection against large claims and losses, the drilling contractor should consider three basic factors:

1. Shopping for insurance "bargains" or omitting certain coverage which may not appear necessary can be extremely costly.
2. Placing policies among numerous agents, with no one agent in a position of responsibility for recommendations on the entire risk, can only lead to confusion.
3. Insurance policies must necessarily be altered and sometimes completely redesigned to fit the needs of a particular risk. The "fine print" in the insurance policy can make the difference between coverage for a loss or no protection whatsoever.

What constitutes adequate insurance for the drilling contractor?

Obviously those occurrences which can cause the greatest possible loss should be considered first, if they are insurable and if the premium is reasonable. The insurance buyer must never lose sight of this principle. It is hard to follow the reasoning of a drilling contractor or oil producer who is satisfied with low liability limits but insists on carrying fire, theft and collision coverage on his automotive equipment.

An adequate insurance program can be divided into two phases:

1. Coverage for direct physical damage.
2. Protection against the claims of others, either employes or public.

Nearly all coverage purchased, from the insured's standpoint, will fall into these two general classifications.

Protection for physical damage. The contractor's automotive equipment is usually insured for physical damage under a comprehensive policy which includes fire and theft and may include or exclude collision insurance. Coverage on automotive equipment is standard and the "ready made" policy should require few changes. Contractors operating near the border of Mexico should know that Mexico is "out of bounds" for standard automobile insurance and a special endorsement or preferably coverage in a Mexican company should be arranged if the equipment crosses the border.

Special consideration must be given to policies covering drilling tools. These policies are not standard as is the case with policies on automotive equipment. All policies covering drilling tools contain certain territorial restrictions. Most policies exclude coverage for offshore drilling unless extended by special endorsement. Many policies exclude coverage for drilling within 100 miles of the Gulf Coast, requiring extension of coverage to this area by special endorsement and payment of an additional premium.

It is also necessary that the contractor know whether or not his policy contains blowout preventer warranties. Quite often a reduced rate is available when the blowout preventer warranty is contained in the policy, but if such is the case care must be exercised that the blowout preventers are always used, or the warranty deleted.

When more than one drilling unit is insured, an automatic coverage clause should be attached to the policy to cover additions, replacements and the acquisition of new equipment. Companies are usually willing to issue an endorsement without additional charge.

Co-insurance clause. Of primary importance is a proper understanding of the co-insurance clause. Policies on drilling tools contain co-insurance clauses varying from 80 to 100 percent. It is absolutely essential that the contractor recognize his obligation to carry insurance to value in compliance with the requirements of the co-insurance clause. For instance, a policy with a 90 percent co-insurance clause, to insure equipment valued at $500,000, should be issued in an amount not less than $450,000. If coverage with a 90 percent co-insurance requirement was issued on this equipment only in the amount of $300,000 and a loss was sustained the insured would be reimbursed for only two-thirds of the loss.

The co-insurance clause was not designed to penalize the insured but to afford reduced rates to policyhold-

ers carrying full insurance to value. Only when the insured takes advantage of the reduced rate and fails to fulfill the requirement is the penalty applied.

Insurance companies are now willing to grant reduced rates when drilling tools are stacked, recognizing that there is a greatly reduced hazard during this period. Coverage is automatic whether the tools are working or idle and the premium is determined by monthly or annual reports. Reduction in premiums may also be obtained by contractors who are not interested in coverage for small losses by purchasing deductible coverage. Policies are available with deductible amounts varying from $1000 to $10,000, with premiums reduced in proportion to the increase in the deductible amount.

Subrogation clause. A very important clause in the insurance policy covering drilling tools is that which relates to subrogation. It is a fundamental insurance principle that the right of the insured to collect for the negligence of a third party, in the event of a loss, is to be transferred to the insurance company paying the loss. This is based on the principle that the insurance company bearing the insured's loss is entitled to his remedies. If the insured, by contract or agreement, waives his rights to collect against third parties he invalidates his insurance contract unless permission to waive such rights is granted by endorsement.

Since nearly all drilling contracts contain a "hold harmless" agreement which waives the right of the contractor to collect from the oil company for damages to drilling equipment in the event of their negligence, all policies covering drilling tools should contain permission for insured to waive his rights to collect from third parties.

Protection for Claims made by others. Most contractors are somewhat familiar with coverage afforded under the compensation and employer's liability policy. This policy, although standard insofar as the basic coverage is concerned, contains loopholes and gaps which must be bridged before the insured can be certain of full protection. Compensation laws are different in each state. All state laws, for instance, are not extra-territorial, and do not apply when employes cross state lines. The Texas compensation act *is* extra-territorial. This simply means that an employe *hired in Texas,* if injured while working for the same employer in another state within one year, may file claim under the Texas compensation act.

Many states have similar extra-territorial provisions in their compensation acts. The Oklahoma compensation act is not extra-territorial. A contractor insured in Oklahoma and drilling in Kansas, unless his policy was temporarily extended by an extra-territorial endorsement or by the attachment of the Kansas compensation endorsement, would have no protection for claims made under the Kansas compensation act.

It is advisable for every contractor to arrange temporary coverage for states other than the ones in which he is operating if he has transitory employes or may have operations across state lines. Such temporary coverage may be afforded in other states, except those having monopolistic state funds, by the attachment of an extra-territorial endorsement. Insuring companies make no charge for this endorsement.

If employes are not considered under the jurisdiction of the workmen's compensation laws of any states, the employer's liability coverage in the combined compensation and employer's liability policy affords protection within the limits of the U. S. and Canada within the limits of liability stipulated in the policy.

Medical coverage. Another phase of compensation insurance, not generally understood, is the medical coverage afforded under the policy. Provisions in the compensation laws of various states vary greatly in the amount of medical indemnity provided by law for the injured employe. While compensation coverage must insure the employer for all of his liability under the compensation act, certain embarrassing conditions are likely to arise unless the employer has provided extra legal medical coverage by endorsement to his compensation policy.

For example, Louisiana affords a medical expense limit of only $500 under the compensation act, which is often inadequate. While sometimes the insurance company is willing to pay in excess of the provisions of the workmen's compensation act in order to rehabilitate an injured employe and speed recovery, they may not be willing to do so when the payment of additional medical expense does not reduce their legal responsibility to the employe.

Certainly employers feel a moral obligation to provide full medical care for employes with long service if seriously injured. It may be an unpleasant surprise to discover that a large medical bill may not be paid by the insurance carrier.

Occupational disease coverage should not be overlooked in those states not providing this coverage in their compensation laws. Coverage is mandatory in the other states but there should be adequate limits of liability in the policy.

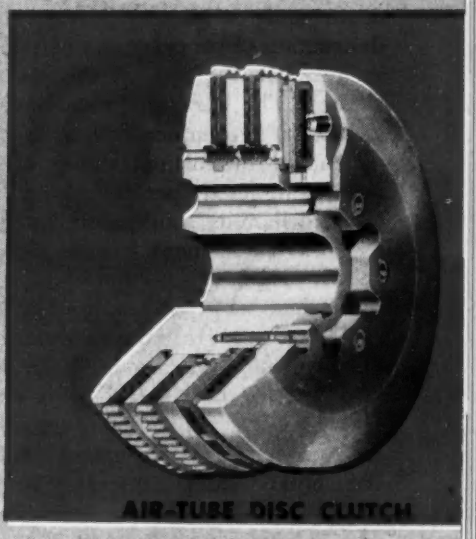
Contractors are liable for the premiums on the earnings of employes of subcontractors if they cannot furnish their own insurance company with evidence of subcontractors' insurance. Premiums for subcontractors' employes are usually picked up by the insurance company auditors at the end of the policy period if the subcontractors' insurance information is not available. A file set up for certificates of insurance on subcontractors at the time that the work is performed is very convenient.

Contractors' general public liability coverage. Public liability policies are not standard. They contain many varying provisions and must be quite carefully analyzed in order to provide proper coverage. If it is at all possible the contractor should insist on a comprehensive liability policy. The coverage afforded, under such a contract, is much broader than the basic schedule liability coverage and requires fewer changes in order to provide the necessary protection. However, it is a 'ready made' contract and needs alteration in order to adequately fit the risk. This is another case where it is necessary to read the 'fine print.'

In brief, comprehensive liability insurance affords protection for damages the insured shall become legally obligated to pay because of bodily

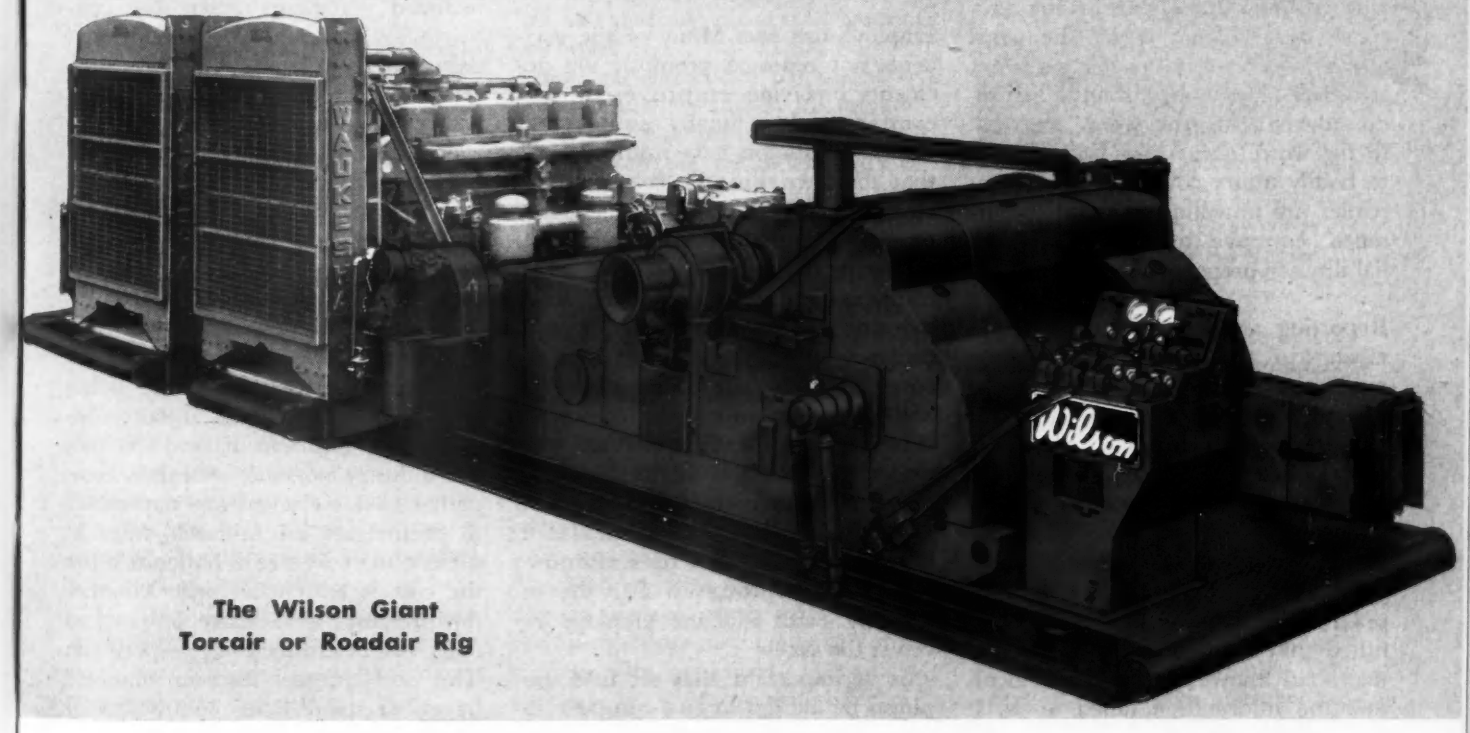
DON'T BUY AN OBSOLETE RIG!

an 8 wheeled auto? Makes about as much sense as a rig manufacturer using three or four kinds of clutches on a rig . . .



AIR-TUBE DISC CLUTCH

BE MODERN-BUY WILSON!



The Wilson Giant Torcair or Roadair Rig

Wilson is the ONLY Drilling Rig Manufacturer Building ALL FRICTION CLUTCH DRIVE RIGS! . . . and Wilson uses ONLY ONE TYPE OF CLUTCH . . . the Famous Air-Tube Disc Clutch. Why worry with an obsolete Jaw clutch transmission? Be Modern—Buy Wilson.

Wilson

The FIRST NAME in DRILLING RIGS!

WILSON MANUFACTURING CO., Inc.

HOME OF RED IRON WICHITA FALLS, TEXAS, U.S.A.

injury, sickness, or disease, including death and because of injury to or destruction of property and caused by accident arising out of the hazards defined. The hazards defined include contractor's premises operations, independent or subcontractor's operations, completed operations, and contractual liability assumed under 'hold harmless' agreement in the drilling contract.

In some comprehensive policies contractual liability coverage is afforded only when notice is given of each drilling contract. This is not a very practical provision. Quite often the well is nearly completed before the actual written contract is in possession of the contractor. It is, therefore, highly desirable that the contractual liability policy afford blanket automatic coverage for contracts usual to the drilling industry.

Most general liability contracts provide coverage for claims arising as a result of accident. When the word *'accident'* is used full protection is not afforded. The policy should be endorsed changing the word *'accident'* to the word *'occurrence'* with respect to bodily injury coverage. Most companies are unwilling to grant 'occurrence' coverage in connection with liability for property damage.

Reporting accidents. Certain claims arising in the courts in increasing numbers have called the attention of careful underwriters to the need for 'late reporting' coverage. Most liability policies contain a provision that when an accident occurs written notice shall be given by or on behalf of the insured to the company or any of its authorized agents as soon as is practicable. If it is definitely established that a foreman or superintendent had knowledge of an accident, and the information failed to reach the insuring agent or company, the insuring company could deny liability for any claim resulting on the grounds that its rights are prejudiced.

Sometimes the insurance company reluctantly undertakes the defense of a claim, not reported at the time of the accident, under a 'reservation of rights' agreement signed by the insured. The insurance company agrees to defend but reserves its rights with regard to acceptance of liability. There is often good and sufficient reason for the insuring company to take such a position.

Quite often its rights have been materially prejudiced by delay in reporting a claim. Sometimes witnesses to the accidents are scattered far and wide; sometimes they are never located. It is obvious that under such conditions the insuring companies are under considerable handicap and their rights are prejudiced. In the event of a small claim, the claim attorney or an officer of the company may waive the provisions of the policy and agree to a settlement.

When claims for large amounts are made a real problem is presented; often only the executive committee of the company, with perhaps ratification by the board of directors may authorize payment. Obviously they might be very reluctant to do so or refuse altogether.

Employe can sue. Many of the accidents not reported promptly are accidents involving employes of subcontractors. It is usually assumed that the subcontractors have insurance and that their workmen's compensation coverage will provide the necessary protection for their employes. It is not generally understood that when compensation insurance is in effect, covering the employes of the subcontractor, that the employe may recover all of his compensation benefits, and then elect to sue the contractor if he or his employes are in any way responsible for his injury. In the event the injured employe receives an award in excess of his compensation benefits the subcontractor's insurance carrier is reimbursed for the indemnity paid and the employe receives the excess.

It is important that all field employes be alerted to give complete information in respect to all accidents whether involving contractor's employes, subcontractor's employes, or others. The contractor should also give consideration to obtaining 'late reporting' coverage which may be added to the liability coverage for the payment of an additional premium.

Underground damage. No discussion of liability coverage would be complete without at least some mention of the contractor's liability for underground property damage and the problem which presents itself in securing protection for any claims made as a result of this hazard. When the case of Ellif vs. Texon Drilling Company et al, was decided by the Supreme Court of Texas, March 3, 1948, in favor of the plaintiff, there was considerable concern among all of the casualty companies underwriting oil business. Endorsements were subsequently attached to all new and renewal policies eliminating the insurance companies' liability for underground property damage as the result of this decision.

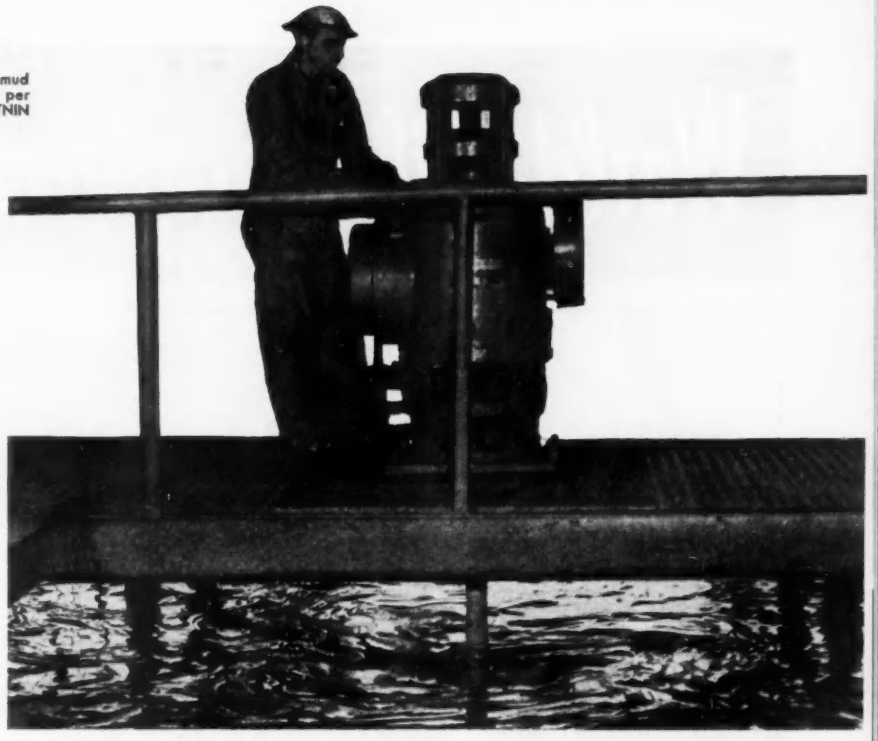
At the Eighth Annual Convention of the American Association of Oilwell Drilling Contractors in October, 1948, William Morris of Allen and Morris, San Antonio, gave a very comprehensive treatment of the subject of "Contractual Liability" and included comments about the contractor's liability for underground damage.

The paper, which was printed and widely circulated, should be read by every contractor and oil producer. Several court decisions have indicated that the drilling contractor in Texas may be liable for underground damages and such liability undoubtedly exists in other states.

Although some insurance companies afford protection for liability for underground property damage it has not yet become what is usually considered an insurable hazard. Neither the industry nor the insurance companies have sufficient loss experience to promulgate an equitable rate. At present the coverage is obtainable but the cost is extremely high. Whether the premium is excessive or not can only be determined by experience. The problem still remains unsolved by either the drilling contractors or by the insurance underwriters.

There will always be insurance problems in connection with a progressive and rapidly expanding industry. The drilling contractor must consider his insurance coverage seriously. In addition to being familiar with the general phases of the insurance program, selection of a responsible employe to cooperate closely with an experienced agent should solve most of his difficulties. —**The End**

READ HOW you get split-second mud control—and save up to $5,000 per year on maintenance—with a LIGHTNIN Mud Mixer like this.



MIX MUD in a FEW SECONDS with a fraction of the power you use now

SPLIT-SECOND control of mud condition! That's what you get with a fast new mixing method, proved now on nearly 100 rotary rigs.

You can mix mud to just the weight and viscosity you want—so fast you won't believe it until you see it work.

You can do it with a small fraction (as little as one-tenth) of the horsepower normally used for mixing mud.

And you can save up to $5,000 per year on maintenance of your mud mixing equipment! Results prove it.

Heavier mud—in seconds. To keep mud uniform, you just use one (or in large installations two) LIGHTNIN Mixers—self-contained units specially designed for this job.

To get heavier mud, you flash-mix weight material into the mud entering the tank or pit. Flash mixing is done by a small high-speed LIGHTNIN unit, mounted at the inlet.

Mud is then circulated rapidly and uniformly throughout the tank or pit by a turbine-type LIGHTNIN Mixer mounted over the mud.

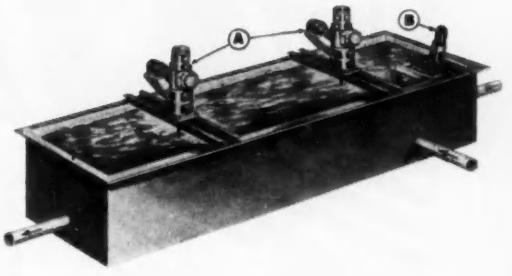
You can add weight material sackful after sackful—as fast as you want to dump it in. You get an *immediate* rise in weight, throughout the whole mud system. A few seconds is all it takes to increase weight of every gallon of mud by the exact amount you want.

You get immediate dispersion of gel ingredients—and in 20 minutes you get fully uniform viscosity.

You keep the entire contents of your mud tank or pit in a perfect state of mix—ready for instant use. Mud characteristics stay *constant*—right where you want them, for best drilling. No mud settles out in the corners of the tank or pit. This saving in mud cost, alone, has amounted to thousands of dollars per location.

Make savings like these. On a new rig, you can eliminate the entire cost of a standby pump, its prime mover, and component piping for jetting mud.

On any rig, new or old, you save *two-thirds or more* what it costs you now to replace pump parts, valves, and fittings worn out in mud agitation service. The only parts in contact with mud are the LIGHTNIN Mixer impellers—built to resist abrasion, yet easily replaced at any time for a fraction of your present maintenance cost.



UNIFORM MUD—in a hurry. Weight and gel dumped in at the LIGHTNIN Flash Mixer (B) are distributed through mud IN A FEW SECONDS by one or two turbine-type LIGHTNIN Mud Mixers (A).

And you can cut your power consumption by about 90%, as compared with conventional mud agitation methods! The entire mixing job takes only 10 to 25 horsepower, depending on size of your tank or pit.

See for yourself. LIGHTNIN Mud Mixers are unconditionally guaranteed to do the mixing job *right* for you. But don't take our word for it—*see for yourself* what LIGHTNINS are doing on rigs in your part of the country. Your nearest LIGHTNIN sales engineer will gladly arrange a demonstration for you—without obligation, of course.

For details, write or wire us today.

Get the FREE FACTS on LIGHTNIN mud control

This illustrated folder, sent you without cost or obligation, tells in 6 minutes how you control mud with LIGHTNIN Mud Mixers. Send the coupon for your copy today.

Lightnin® Mixers

MIXCO fluid mixing specialists

MIXING EQUIPMENT Co., Inc.

197-m Mt. Read Blvd., Rochester 11, N. Y.

In Canada: Greey Mixing Equipment, Ltd., 100 Miranda Avenue, Toronto 10, Ont.

Please send the FREE 6-minute picture story on cutting costs with LIGHTNIN Mud Mixers.

Name_____ Title_____

Company_____

Address_____

City_____ Zone_____ State_____

World Oil Graphics

Rotary Hose

Kinking, deforming and careless handling of rotary hose while rigging up may cause failure under pressure.

Prevent damage by uncoiling, hoisting and installing hose in derrick, avoiding contact with sharp rig structure.

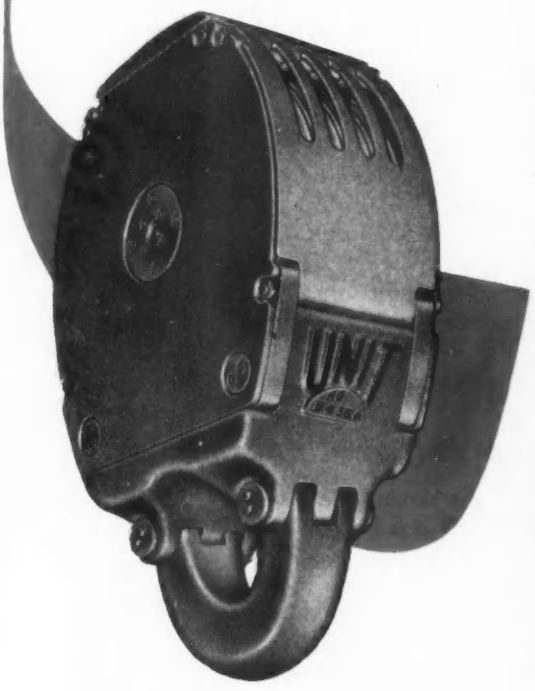
NOW...

a New Line of Traveling Blocks

designed and manufactured by **UNIT RIG**

BLOCK-HOOK UNITS			
MODEL	NO. SHEAVES	SHEAVE DIA.	CAPACITY
BH-430-A	4	30"	100 TONS
BH-438-A	4	38"	150 TONS

BLOCKS			
MODEL	NO. SHEAVES	SHEAVE DIA.	CAPACITY
B-430-A	4	30"	125 TONS
B-438-A	4	38"	200 TONS
B-544-A	5	44"	300 TONS



Look at these FEATURES

- PROPER WEIGHT DISTRIBUTION FOR . . . STRAIGHT RUNNING—FREE FALLING OPERATION
- SHEAVES HAVE ROLLED FORGED SEAMLESS STEEL FLAME HARDENED RIMS
- SHEAVES MOUNTED ON DOUBLE ROW TAPERED BEARINGS . . . INDIVIDUALLY LUBRICATED
- STREAMLINED FOR SAFE OPERATION AND EASY HANDLING
- AVAILABLE IN THREE SHEAVE SIZES—FIVE MODELS

UNIT UNIT RIG

UNIT RIG & EQUIPMENT CO.

TULSA, OKLAHOMA, U. S. A.

WRITE FOR CATALOG SHEET TODAY
—OR CONTACT YOUR SUPPLY STORE

UNIT RIG DRAW WORKS ARE SOLD THROUGH THESE DISTRIBUTORS IN THE U.S.A. AND CANADA

BOVAIRD SUPPLY COMPANY • IVERSON SUPPLY CO • LUCEY PRODUCTS CORP.
MID-CONTINENT SUPPLY COMPANY • NORVELL-WILDER SUPPLY COMPANY
THE REPUBLIC SUPPLY CO. OF CALIFORNIA
AND OTHER LEADING SUPPLY STORES

EXPORT SALES—MID-CONTINENT SUPPLY COMPANY
45 Rockefeller Plaza, New York 20, N. Y. Cable—MIDUNITRIG

A-547

How to Run and Handle Drill Pipe

PART 2

- **Improper handling results in fishing jobs.**
- **Here are some do's and don't's.**

By RICHARD L. DAILEY, Training Specialist,
The University of Texas, Extension Division, Austin

Use slips and safety clamps . . .

The bit is made up hand-tight and lowered into the bit breaker in the rotary table for final tightening with the tongs. The bit breaker is removed from the rotary table and the first collar is lowered away. The slips are set to hold the collar and the safety clamps are put on as insurance that the collar will not drop through the rotary table should the slips let go. Six thousand feet is a long way down!

Use a 'tail wagon' . . .

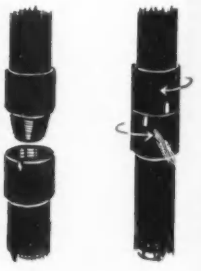
The "tail wagon" is best used on the pin end and when protectors are not being used. If protectors are used, there's no necessity for the dolly. The collar can be pulled along the walk without fear of damaging threads or shoulders. A drag of only a few feet could be just as damaging as a drag of 30 feet if there are spike nails or steel plates on the walk to cut or bend the threads. If the dolly is going to be used, it's logical it should go all the way to the ramp and then the block and chain could be attached to snub the collar into the derrick. Extra protection could be given by sweeping and washing down the ramp.

Handle chain carefully . . .

Very little time is lost removing the protectors on the floor before the collars are stabbed. The spinning chain should be transferred from the lower collar in such a way that the chain will not be caught or crushed between the shoulders of the pipe or collars. The chain can mar the shoulders and a spinning chain could easily do considerable damage to the threads. This, of course, would prevent a good seal and a washout would occur. The chain is weakened and a parted chain could put a man in the hospital. Care should also be taken to see that the tong dies do not overlap the joints. A collar could be "peeled" at the shoulders and this also would prevent a seal due to turning the edge of the shoulder and creating a high spot.

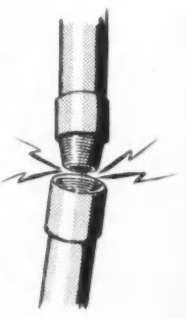
Use correct torque . . .

Some authorities on drilling strings say that tonging is the most critical problem in preserving the life of the pin and box of the collar. One way of measuring torque on six-inch collars with 4½ inch connectors is to make up the collar shoulder tight; then place a mark on the collars ¾ inch apart. Torque is correct when the two marks are together. There are other ways to measure the torque applied in making up collars; one of which is "torque gauge."



Avoid setting pin end on box . . .

Setting the pin down on a box and then rolling it off is a box or pin injury to which little attention is paid. Threads on one side of the box are hit with full force of the dropping collar. This may cause the threads to become bent or burred. The pin, of course, mars the shoulder. Crooked threads make up tight before the shoulders are fully engaged allowing the pin to wobble and receive all of the bending load. The inclined plane on this pin shows a typical fatigue break caused by a wobble.



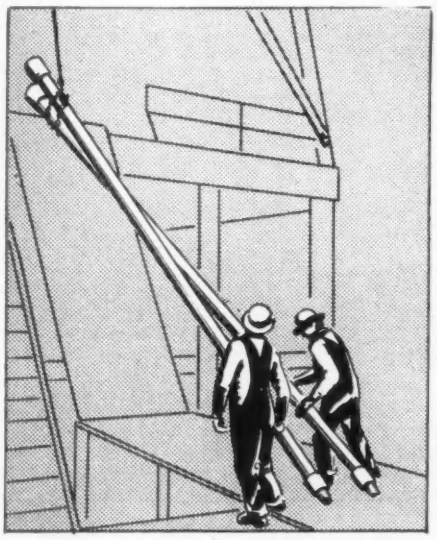
CARING FOR DRILL PIPE

Next comes drill pipe . . .

Before the change-over is made from drill collars to drill pipe, the collars are weighed in the drilling fluid. The driller will then know how much weight to put on the bit.

Next comes the drill pipe. There are a few rigs that use any kind of protection against injury to the threads and shoulder of the drill pipe while picking up. Even though this is an almost universal method of handling pipe, the question of using protectors on drill pipe should be carefully considered. A pin or box failure on drill pipe can leave just as many, or more, expensive drill collars in the hole as a failure of a pin or box on the drill collars themselves. One or more joints, depending on the size, can be pulled into the V-door. This drill pipe was protected by being lowered easily onto the edge of the ramp inside the V-door. Dropping the pipe may mean bending it or making a transverse scar on the pipe which can eventually result in a twist off.

Two pick-up methods . . .



There are two ways to pick up the pipe: by "ones" and by "twos." In the "two" method one joint is picked up and run into the mouse hole. The cat line is taken off the one in the mouse hole and put on the second joint in the V-door. In the meantime, the elevators are latched onto the pipe in the mouse hole, the joint is brought out and made ready for stabbing. The second joint, the one remaining in the V-door, then follows the routine of the first joint as the first joint is being made up. The threads of the pin are cleaned of any dirt or trash picked up off the walk, stabbed, spun up with a rope or spinning chain, and tonged up tight.

Drill pipe should not be made up as tight as collars, but, great care should be taken when tonging drill pipe since under-tonging can be just as detrimental as over-tonging. Over-tonging can stretch the threads and spread or bell the box. Some method of measuring torque applied in tonging drill pipe would be helpful.

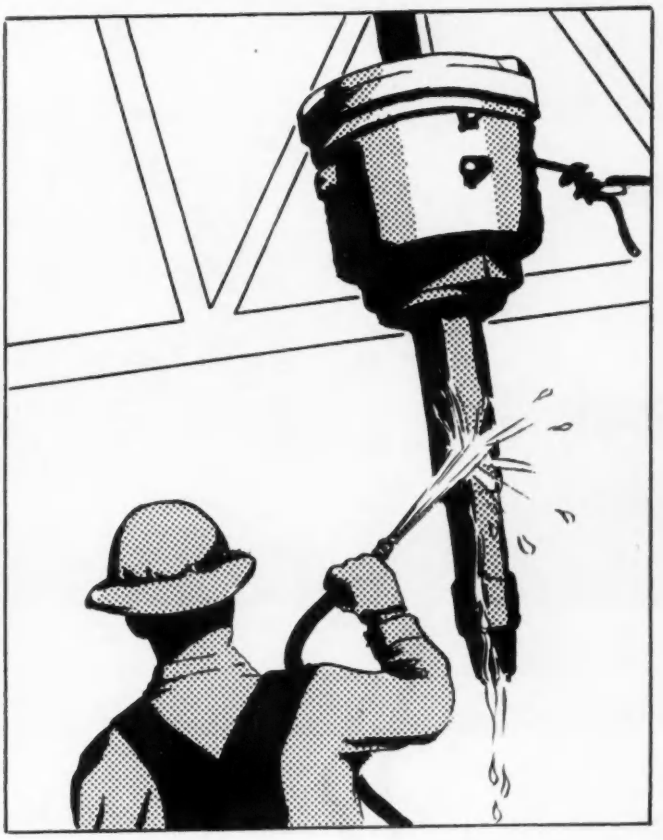
To keep from bottle-necking the pipe, the slips are set only after the pipe has stopped. Threads on new pipe or collars should never be spun up fast.

New threads gall easily. In making-up or breaking-out, cold-work the threads until they resist galling. Many twist-offs are attributed to the slips and tongs having dug transverse scars into the body of the pipe near the tool joint. Aggravation of the scars by torque and bending while drilling causes the pipe to fail.

Guard the investment . . .

The long trip to the bottom of the hole is just about over. We are made conscious of what an owner has invested in his drilling strings. The average drill collars cost about $1200. The average joint of pipe with hard faced tool joint runs right at $150. With 18 drill collars and 8000 feet of pipe, a little more than $58,000 can disappear down the hole plus possible loss of the hole. An investment worth taking care of.

To be consistent in trying to preserve the life of the string, inspection of the kelly-saver sub becomes a habit every time a joint is added to the string. It must mate with each joint of pipe from the time the well is spudded in until completion, and if there is any flaw in the threads or shoulder, well, every joint can be affected.



Inspection of the kelly-saver sub should become a habit. On this connection hangs the entire drill string. It should be washed down and checked whenever disconnected.

Part 3 of this series in a coming issue.

SPEED plus

94′ TRAILER-MOUNTED MAST FOR DRILLING AND SERVICING...

The new Lee C. Moore trailer-mounted mast can be ready to drill in record time from arrival at location.

It telescopes to transportation length in a matter of minutes and when extended the legs are in true alignment. There is no overlap of upper and lower sections.

No guy lines are required.

The draw works and mast never leave the trailer. The truck backs trailer up the ramp to the substructure. The trailer is then secured in place and the mast is ready to raise.

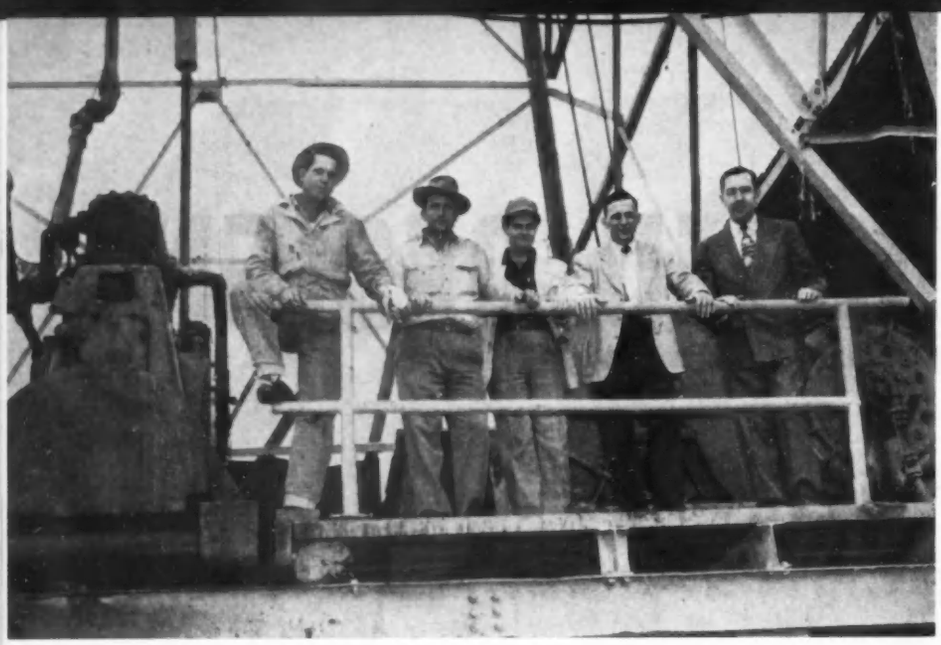
Write for complete information.

EXTRA RUGGED DESIGN

LEE C. Moore CORPORATION

TULSA • DALLAS • HOUSTON • MIDLAND • SHREVEPORT • WICHITA • CENTRALIA • PITTSBURGH

Export Office — Room 624, International Bldg., 630 5th Ave., New York 20, N. Y.



DISCOVERY WELL SCENE at Sunray Oil Corporation's Northwest Branch field, Acadia Parish, Louisiana. Left to right are Driller Boone, Toolpusher Aycock, Engineer Fred L. Gaye, Field Geologist Frank Hardin and Division Geologist Bert C. Timm.

Good Drilling Mud Practices Saved Them Time, Money

Here's how proper mud control combined with efficient drilling practices has paid off for Sunray in its Northwest Branch field of South Louisiana.

By FRED L. GAYE, Sunray Oil Corporation, Rayne, La.

GOOD MUD CONTROL combined with good drilling practices resulted in substantial savings in drilling costs as well as faster penetration rates for Sunray Oil Corporation in its operations in the Northwest Branch field, Acadia Parish, Louisina. The company has drilled nine wells in the field, six producers and three dry holes. Production is from Basal Frio sands at depths from 10,200 to 11,300 feet.

Sunray's mud cost in the area has been approximately 40 percent of that of other operators in the area. Average mud cost per well was $20,-929 for the nine wells. The average cost for other operators who have drilled in this area has been approximately $50,000 per well.

Calcium base muds with a minimum quantity of low specific gravity solids proved very effective drilling fluids. Sodium carboxymethylcellulose was used extensively because of its excellent weight suspension properties and wall building characteristics. These low solid muds incorporated with good drilling practices resulted in a minimum amount of trouble from gas and lost circulation which are common to this area.

AUTHOR GAYE checks drilling mud sample at a Sunray well in Northwest Branch field.

Oil emulsion muds effectively increased drilling rates from two to three times that of the water base muds. Bit footages were increased in almost the same ratio. These emulsion muds also tended to minimize many of the drilling hazards present.

Drilling practices. The discovery well in the Northwest Branch field was completed December 24, 1951. Drilling practice is to cut a 15-inch hole to 1850 feet where 10¾-inch casing is set and cemented. A 9⅞-inch hole is drilled to approximately 8500 feet where the mud system is converted to calcium base. Mud maintenance is then initiated and a gradual mud weighting up process begun. Drilling the 9⅞-inch hole is continued to approximately 10,000 feet. An electrical survey is run at this depth for correlation purposes and the hole is then continued to the top of the first possible productive zone.

During the early stages of the field development the objective sand zones were cored with full hole wire line coring equipment. However, the hardness of the formation, the length of time consumed with this method, and the percent of recovery prompted the introduction of small hole diamond coring. When the required amount of coring is completed, the 9⅞-inch hole is continued to a point approximately 100 feet below the base of the bottom sand in this series. Seven-inch protective casing is run and cemented with 600 sacks of slow-set cement with four percent gel. The lower 800 feet of the casing is equipped with scratchers spaced at intervals of approximately 15 feet and 12 centralizers spaced over this range.

The mud weight is conditioned to the maximum weight inside the casing before drilling out. A 6⅛-inch hole is then drilled from the protective casing to the top of the next possible production zone. This sand is approximately 100 feet thick and is full hole wire line cored. The 6⅛-inch hole is continued to a point of 50 feet below the base of this sand to a total depth of approximately

EASTCO

DOUBLE CHECKS

your survey...

"Here is reproduction of drift indicator disc, actual size, showing both recordings 4½° off vertical."

. . . WITH EASTCO SELF-CHECKING MECHANICAL DRIFT INDICATOR

There are other drift indicators, but Eastman, and only Eastman makes one to DOUBLE CHECK itself (2 readings) with a 40-second interval between.

No batteries, light bulbs or photo sensitive discs are used. The Eastco Self-Checking Drift Indicator is COMPLETELY MECHANICAL.

This instrument is the smallest drift indicator on the market. It can be go-deviled or lowered into the hole on any conventional line.

Operators may contract for this instrument on a daily or term rental basis at a nominal charge. Call the nearest Eastman office for details and a demonstration.

...another instrument perfected from Eastman's years of field experience, engineering, research and design development work.

Call an Eastman Engineer today; He's ready to serve you Anywhere, Anytime!

Eastman Oil Well Survey Company

LONG BEACH DENVER HOUSTON

Export Sales and Service:
EASTMAN INTERNATIONAL COMPANY
P. O. Box 1500 Denver, Colorado

DIRECTIONAL DRILLING Eastman OIL WELL SURVEYS

11,300 feet. A five-inch liner is then hung in the seven-inch casing and cemented. All sands are tested as required for geological and reservoir information.

The six successful wells are producing from either the Nodosaria blanpiedi No. 1 sand at approximately 11,200 feet, or the Nonion struma No. 1 sand at approximately 10,700 feet.

Mud properties and application

Mud requirements: The absence of producing sands and abnormal pressures to a depth of approximately 8500 feet makes it possible to have less regard for mud quality to this depth. Adequate water and sufficient bentonite to maintain good hole conditions are all that is required. It is advisable to initiate mud conditioning at approximately 8500 feet and continue supervised maintenance to total depth. At 8500 feet it is possible to reduce safely and sufficiently the low specific gravity solids before a gradual weighting up process is begun.

This reduction of solids with water results in an easier and more complete conversion to calcium base mud. Conversion at this point is advisable due to the highly bentonitic limy shale sections which exist, and the heavier mud weight required to total depth. Conversion to calcium base mud eliminates the possible contamination from the formation lime and suppresses the hydration of the bentonitic shales, thereby reducing their mud making tendencies. This reduces the amount of water dilution required to maintain a low solid mud.

The productive sands encountered in most of these wells before the protective casing point are the Marginulina texana No. 1, Marginulina texana No. 4, and the Nonion struma No. 1. The formation pressures of these reservoirs are approximately 6165, 5715, and 5075 pounds per square inch. In order to have sufficient pressure differential between the mud hydrostatic head and these formation pressures it is necessary to maintain a minimum mud weight of 12.5 to 13.0 PPG when penetrating these zones. After protective casing is set through these sands, the mud weight is increased to approximately 14.3 PPG inside the casing. This is the present required weight to give sufficient pressure differential while penetrating the bottom sands. Wireline and diamond coring in these holes require a higher degree of mud quality than would otherwise be necessary. Good hole conditions and good quality mud are also required in order that the casing may be reciprocated after being run and during the cementing process. The mud must be of a type that will, insofar as possible, when accompanied with good drilling practices, minimize the lost circulation difficulties.

Surface mud system: The surface mud system consisted of either two large steel pits or three smaller steel pits. The total capacity of two large steel pits was approximately 600 barrels and the total capacity of three smaller pits from 600 to 750 barrels. Supplementing these pits were two or three production tanks of 300-barrel capacity each. These production tanks were installed on location and placed in service as mud storage tanks only.

As the active mud volume was increased and exceeded the capacity of the mud pits, it was pumped into the production tanks where it was available for emergencies or for increasing the volume of the active mud system. A steel mud ditch was installed from the shale shaker to the suction pit and arranged to bypass any or all mud pits to the suction pit. Because of the large amount of rainfall a complete roof was used on the suction pit.

A minimum of three mud pumps was maintained on location. One large pump was used to circulate the mud in the hole. One pump was used as a standby pump to supplement or replace the circulating pump, or supplement the smaller pump if necessary when mixing mud additives through the hopper. The smaller pump was used to circulate mud through the mud guns for agitation, or through the hopper when mixing additives.

A pit level recorder was used to provide a continuous record of surface mud volumes and any variations which occur with blowouts or lost circulation. Some consideration was given to the application of degassing units and centrifuges.

Mud operating procedure: At a depth of approximately 8500 feet, prior to conversion and while the drill pipe was out of the hole on a trip, the mud from the suction pit was pumped into the storage facilities and the pit completely cleaned of all sand and settlings. If three pits were used, the first pit was left full of native mud for emergency and bypassed. The mud volume in the middle pit (or first pit if only two pits were in the system) was allowed to flow into the empty suction pit and equalize. The drill pipe was then run into the hole and conversion begun on this minimum volume system.

The mud was first treated with quebracho and caustic soda and circulated through the hole and into the middle pit. All the sand settled out here and the mud proceeded to the suction tank where it was treated with calcium hydroxide (lime) and converted to a lime base mud. This converted mud was circulated through the hole and then bypassed to the suction pit where it was diluted with water to reduce further the low specific gravity solids and treated with sodium carboxymethylcellulose. The active volume was kept to a minimum at this point in order to accommodate the increase in volume which resulted from the addition of weight material. The pit where the sand was allowed to settle out contained very little mud and it was emptied and cleaned. As drilling progressed and the active mud system became excessive due to further weight additions and water dilution, this excess mud was stored in the empty pit. When necessary, the untreated mud which had been pumped into the storage tanks was disposed of and replaced by excess treated and weighted mud from the system.

This procedure required a minimum active volume system to convert and weight up, thereby resulting in savings in mud costs while a sufficient volume of untreated mud, which could rapidly be made functionable, was kept readily available in case of emergency.

It was also possible to salvage and store a large volume of excess mud when protective casing was run and cemented. After the casing was run, the mud weight was increased to the maximum inside the pipe. Before this was done, the volume of the active system was again reduced to accommodate the increase in volume due to the addition of weight material and the excess pumped into the storage tanks.

This again resulted in a minimum system to be weighted and required less materials. Only one pit (suction)

was used in the active system. Constant agitation from mud guns in the suction pit was maintained as much as possible. The low mud velocity in the steel mud ditch allowed the sand to settle there and be disposed of periodically. The excess mud was treated only if used but was always readily available for emergencies.

Such procedures as these materially aided in keeping the mud costs at a minimum. It was possible to replace mud lost during completion procedures with mud from storage instead of building new volumes, and the excess mud on hand at completion was transported to the next location to supplement the treated system there.

With a long-range drilling program it would be possible to exploit this transferring of mud to its fullest advantage. The normal value of the mud on hand was around $8 per barrel and the cost of transferring the mud and storage tanks approximately $1.25 a barrel. Based on a possible volume of 800 barrels this could amount to a saving of $5400 per well.

Mud performance. The drilling fluid properties and their performance directly affect penetration rates, footages per bit, hole conditions and possible fishing operations. Two basic types of mud which greatly control these conditions are those in which oil in emulsion form is not used in the drilling fluid and the other is where oil in emulsion form is used to improve the mud qualities.

Muds without oil emulsion were used on all of the wells in Northwest Branch to the depth of mud conversion, on seven of the nine wells from the depth of mud conversion to the casing point, and also on five of the eight wells which were drilled below the protective casing point to total depth. The average penetration rate from the surface to approximately 8000 feet was 72 feet per hour. The average rate from 8000 feet to the protective casing point was six feet per hour. The average rate from the casing point to total depth was 2.4 feet per hour.

Mud with oil emulsion was used on two of the nine wells while drilling from the depth of mud conversion to the casing point and on three of the eight wells which were drilled below the protective casing to total depth. The average penetration rate from the point of conversion to the protective casing point was 12 feet per hour. The average penetration rate from the protective casing point to total depth was 7.7 feet per hour.

A comparison of these drilling rates shows an increase of 100 percent in the penetration rates with oil emulsion muds over non-oil emulsion muds while drilling above the protective casing point and a 213 percent increase in the penetration rate with oil emulsion mud over non-oil emulsion mud while drilling below the protective casing to total depth.

Figure 1 shows graphically the comparative drilling rates for each well completed. The graph is divided into three different intervals of the holes.

The top interval reflects the comparison to a depth of approximately 8000 feet and indicates all were drilled at the same rate when conditions were similar.

The middle interval reflects the comparison from 8000 feet to the protective casing point.

The third interval reflects the comparison from the casing point to total depth.

Figure 2 illustrates the accumulative drilling times for all wells drilled with and without oil emulsion mud. Actual drilling time not including trips to a depth of 11,500 feet is approximately 12 days less with oil emulsion mud.

Bit footage increased. Not only was the penetration rate increased by use of oil emulsion mud, but the footage per bit was also substantially increased. The average footage per bit without oil emulsion from 8000 feet to protective casing point was 122 feet. With oil emulsion mud the average footage per bit for this same interval was 190 feet per bit. This represents a 56 percent increase in footage per bit with oil. From the protective casing to total depth without oil emulsion the average footage per bit was 52 feet.

With oil emulsion mud the average footage per bit for the same interval was 155 feet. This represents a 198 percent increase in footage per bit with oil. Figure 3 reflects the comparative footages per bit for all wells and how important oil emulsion mud has been in reducing the number of bits required.

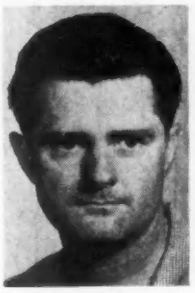
Based on these penetration rates and the comparative footages per bit, two typical wells have been used to show the possible difference in drilling costs between a well drilled with oil emulsion mud and one drilled without oil emulsion mud. This is presented in Table 1 and reflects the rig time costs and bit costs only.

Even though this could be interpreted to result in more advantage to the drilling contractor if drilling on footage basis, any procedure made possible by the operator to improve the penetration rate so phenomenally as this should result in a substantial reduction of footage drilling costs.

Reduce hole friction. The increase in penetration rate and footage per bit is partially explained by the tendency of the oil emulsion to reduce the hole friction and its tendency to prevent the bit from seriously balling up and becoming ineffective. The less the hole friction the more nearly the effective weight on the bit approaches the indicated weight. With limitations this increase in effective weight on the bit should improve penetration rate. If the bit becomes balled up and the teeth are prevented from cutting, then the penetration rate is seriously hampered.

Drilling time per bit has been reduced with oil emulsion mud. While the footage per bit has been extended

About the Author



FRED L. GAYE began work for Sunray Oil Corporation in October, 1951, following previous roughneck, engineering, and accounting experience with Parker Drilling Company, Harper & Turner Oil Company, Magnolia Petroleum Company, and Magnet Cove Barium Corporation. He is a graduate of the University of Oklahoma in petroleum engineering. At the present time he resides in Rayne, La., and is Sunray mud engineer operating out of the company's Production department district office at Lake Charles, La.

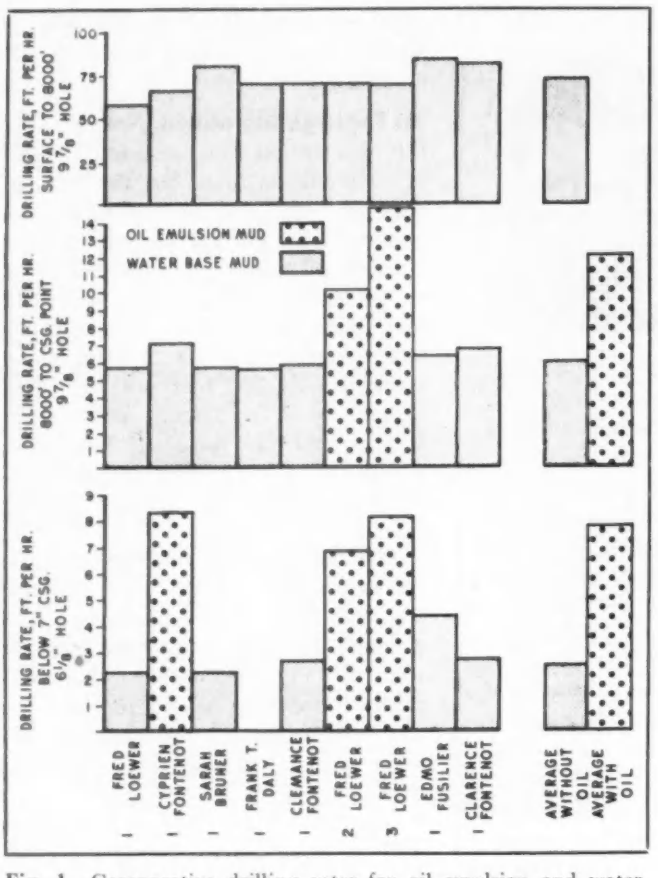

DRILLING RATE, FT. PER HR. SURFACE TO 8000' 9 7/8" HOLE
DRILLING RATE, FT. PER HR. 8000' TO CSG. POINT 9 7/8" HOLE
OIL EMULSION MUD
WATER BASE MUD
DRILLING RATE, FT. PER HR. BELOW 7" CSG. 6 1/8" HOLE
FRED LOEWER 1
CYPRIEN FONTENOT 1
SARAH BRUNER 1
FRANK T. DALY 1
CLEMANCE FONTENOT 1
FRED LOEWER 2
FRED LOEWER 3
EDMO FUSILIER 1
CLARENCE FONTENOT 1
AVERAGE WITHOUT OIL
AVERAGE WITH OIL

Fig. 1—Comparative drilling rates for oil emulsion and water-base muds in Northwest Branch field (March 23, 1954).

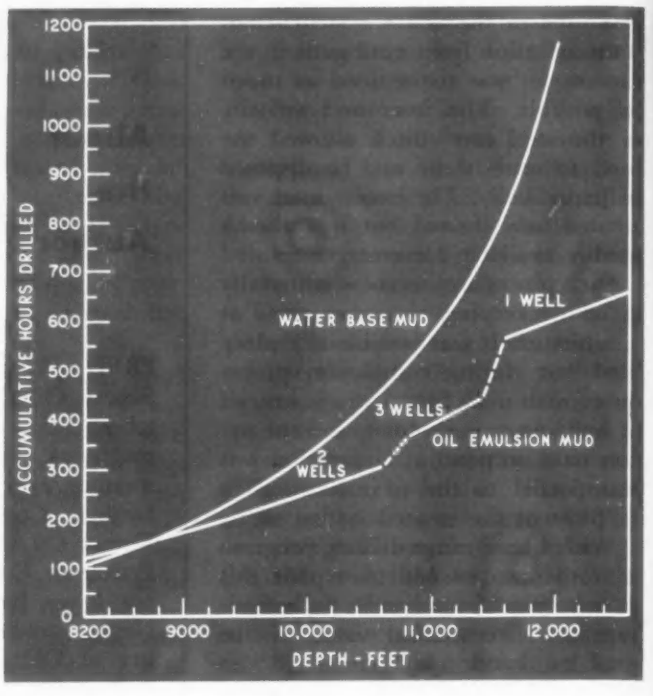


Fig. 2—Comparison of drilling rates Northwest Branch field (March 23, 1954).

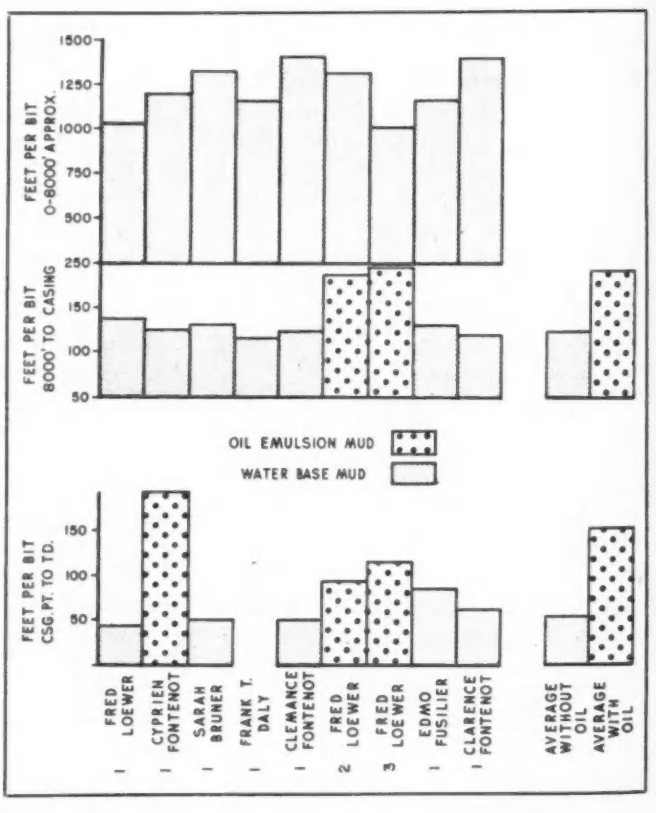


Fig. 3—Comparison of footage per bit, oil emusion and water-base mud (March 23, 1954).

from 1½ to 3 times with oil emulsion mud, the actual bit life in hours has been reduced approximately 20 percent. This is caused by the bit doing more work at a higher rate and not balling up while staying on bottom and drilling.

These above factors also affect a lost circulation problem. The higher the hole friction to mud movement the higher the resulting back pressure on the formation while circulating. If this back pressure becomes excessive, it is possible to break the formation down and create lost circulation. Also, if the bit is seriously balled up, this ball could create such a restriction above the bit nozzle that excessive pressures against the formation at the bottom of the hole could result in lost circulation. Many of the blowouts which occur in South Louisiana are directly associated with balled up bits and trips to change bits. Oil emulsion mud minimizes both of these factors and with fewer trips required safer drilling practices result.

Any fishing job would be improved with oil emulsion mud. A good example of this occurred during the drilling of Fred Loewer 3. While making a trip on this well at a depth of 9864 feet, the drill pipe parted and 45 stands dropped to bottom. Eleven hours later it was possible to get an overshot over the fish and recover it completely. Usually washover operations are necessary under similar circumstances.

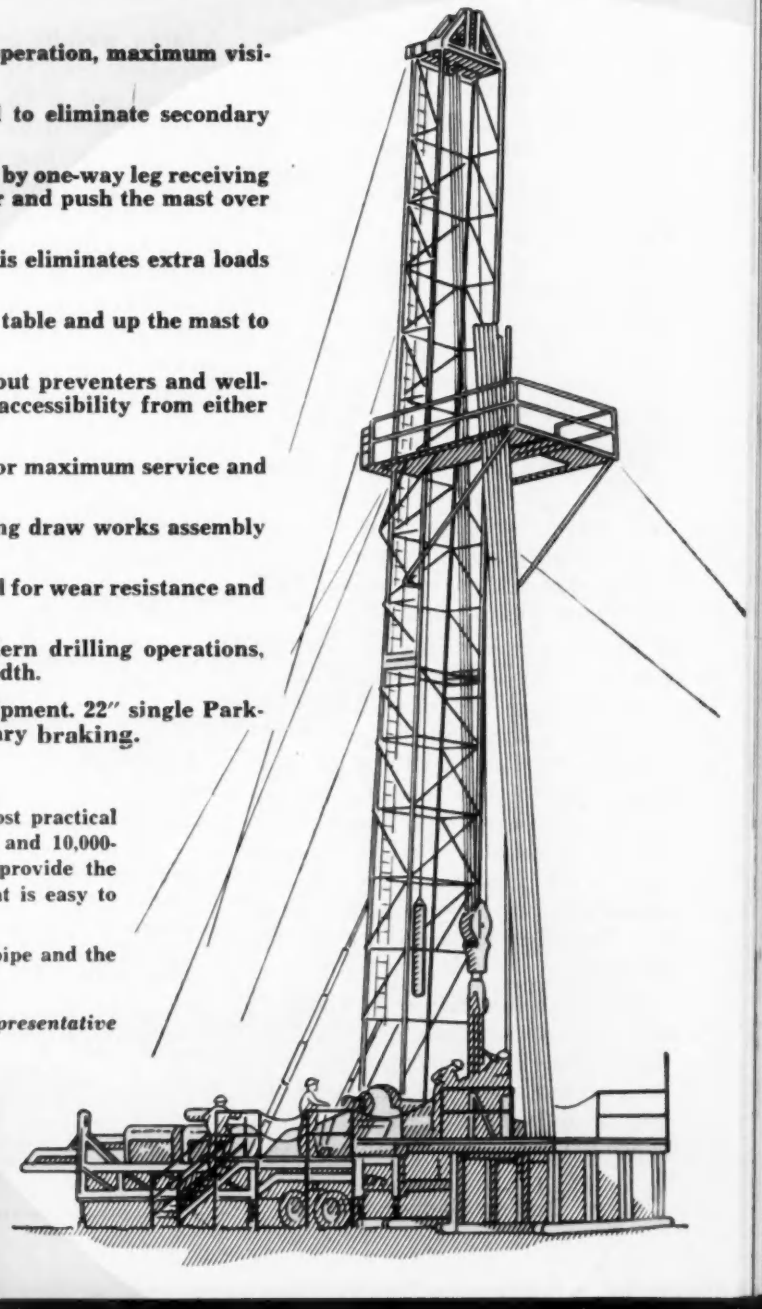
Better core interpretation. Possible reduction of drilling costs and advantages such as these should justify considerable expenditure of time and effort toward possible improvement or adjustment of geological interpretative methods in order to permit the use of oil emulsion muds. Decisions with reference to the use of oil emulsion muds should not be based entirely upon a single experience in the

CARDWELL "TRAILERIG"

IS 15 WAYS BETTER

...than any comparable rig

1. **Mud Pump Drive is driven by draw work's engines through a Cardwell air friction clutch, which is capable of handling the full horsepower of the rig. Full horsepower of the rig can be used for hoisting and for driving the rotary and pump when drilling. Moving and rigging up is simplified with this built-in mud pump drive.**
2. **"Trailerig" with two engines is within eight feet road width for maximum portability regardless of the overall length of the engines. Placement of engines eliminates eccentric loading and engine overhang.**
3. **Truss-type trailer frame gives exceptional strength and rigidity with minimum weight.**
4. **All rig assemblies are easily accessible.**
5. **Catheads are located ahead of driller for ease of operation, maximum visibility and safety.**
6. **Single chain rotary drive is placed well forward to eliminate secondary chain drives to table.**
7. **One-way rams erect the mast and are supplemented by one-way leg receiving rams which support the mast as it goes over center and push the mast over center when lowering.**
8. **No trailer ramp is needed with the "Trailerig"; this eliminates extra loads and rig-up time.**
9. **Driller has maximum visibility, both to the rotary table and up the mast to the racking platform and crown.**
10. **Ample space is provided under platform for blowout preventers and wellhead connections without using ramps. Complete accessibility from either side.**
11. **Crown sheaves are mounted on Timken bearings for maximum service and life.**
12. **"Trailerig" is a completely unified design combining draw works assembly and telescoping mast with trailer frame.**
13. **Every wearing part of the "Trailerig" is heat-treated for wear resistance and long service life.**
14. **Two-engine drive gives power necessary for modern drilling operations, yet the "Trailerig" does not exceed 8-foot road width.**
15. **Circulating water-cooled brakes are standard equipment. 22″ single Parkersburg Hydromatic brake is available for auxiliary braking.**



This Cardwell "Trailerig" has proved to be the most practical and profitable rig available for 5,000-foot drilling and 10,000-foot workover jobs. It is designed and built to provide the modern drilling contractor with a complete rig that is easy to move and rig-up, and fast in operation.

With the addition of a mud pump, a string of pipe and the usual tools, the "Trailerig" is ready to drill.

Write today for catalog and prices, or see nearest Cardwell representative

CARDWELL MFG. CO. INC.

P. O. Drawer 2001 . . . Long Distance Telephones 128—129—130

Cable Address: "ALL STEEL," Wichita — "CARDSTEEL," New York

Wichita, Kansas, U. S. A.

Northwest Branch field. A core which was cut using a diamond core barrel in one well had a permeability of 8400 millidarcys. This was several hundred percent more permeable than the average productive sand in this field. This core was flushed with the oil and water from the mud. Due to the extremely high permeability of the sand, had the fluid phase of the mud been water only, this water phase would have also flushed the core. This type of permeability is so rare in Northwest Branch that the use of oil emulsion muds should not be restricted solely on the probability of its existence. The amount of flushing in this particular core could have been greatly minimized by a higher degree of emulsification.

Lost circulation. The Northwest Branch field is located in an area where lost circulation is a serious problem due to the heavy mud weights required. Of the nine wells drilled by Sunray in this field, only one required the application of lost circulation material. Cause of the lost circulation was attributed to improper drilling practice even though the mud weight was the highest that had been used in the field.

The drilling crews had not been sufficiently impressed with the importance of starting the mud pump with caution when resuming circulation. While drilling this well, circulation was completely lost by attempting maximum circulation pressure too soon after making a connection and thereby breaking down the formation and losing all returns. Proper instructions and orientation have eliminated this practice.

The approach to the lost circulation problem in Northwest Branch field has been the close control of drilling practices and the proper application of muds containing low concentrations of low specific gravity solids conditioned with sodium carboxymethylcellulose. Results have justified this type of mud. However, the advantages of the most ideal mud may be offset by improper drilling practices.

Serious consideration is given to drill pipe movements while drilling these wells. The maximum safe rate for pipe movement in and out of the hole is difficult to determine as it depends upon many variable factors. Some of these are mud viscosity, weight and gel strengths, drill pipe and drill collar size, and hole size. The lower the mud viscosity, weight and gel strengths and the greater the clearance between the drill string and the hole size, the more it is possible to establish a faster rate for pipe movement going in the hole without breaking the formation down.

The lower the viscosity and gel strengths and the greater the clearances, the more it is possible to establish a faster pipe withdrawal rate with lower pressure differentials between mud hydrostatic head and formation pressures. Good mud characteristics make it possible to maintain lower mud weights safely, which in turn also reduces the chances for lost circulation. Attempts are made to arrive at a reasonable rate for these pipe movements and the rate is altered as the conditions change.

Adding weight material. Another procedure over which control must be exercised is the rate of adding weight material to a system. At one well while drilling below the protective casing, weight material was added to the system at too rapid a rate and lost circulation occurred. The weight material was added so rapidly that the desired maximum mud weight was exceeded. When the formation broke down, the hole contained a large volume of mud which was too heavy. A large volume of lighter mud was lost before it was possible to completely displace the heavy mud from the hole. After this was accomplished, full circulation was established and no further difficulty developed.

Mud costs

Factors affecting mud costs: The number of factors which influence the actual mud costs are many, and the more variable they are the more difficult the job of comparison becomes. The first and most important is the degree of difficulty experienced, especially from a standpoint of lost circulation or a blowout. The mud costs for the second well drilled in this field were 88 percent higher than the average cost per well for the remaining eight wells.

This well experienced a semi-severe lost circulation problem. Two other factors are the hole size and the depth at which the protective casing is set. The larger the hole size and the deeper the protective casing the greater is the volume of mud which requires chemical maintenance and weight. After protective casing is set, the active volume of the system is sometimes reduced as much as one-half.

The required weight schedule is also very important. The most important phase is the required weight before the protective casing is set; that is, before the system's volume is considerably reduced. This required weight has varied in this field, as has the weight schedule below protective casing varied. Another very important factor is the price changes of mud additives. Practically all materials increased in price during the drilling of the sixth well and is reflected as approximately a 10 percent increase

Continued on Page 177

TABLE 1

Without Oil Emulsion Mud

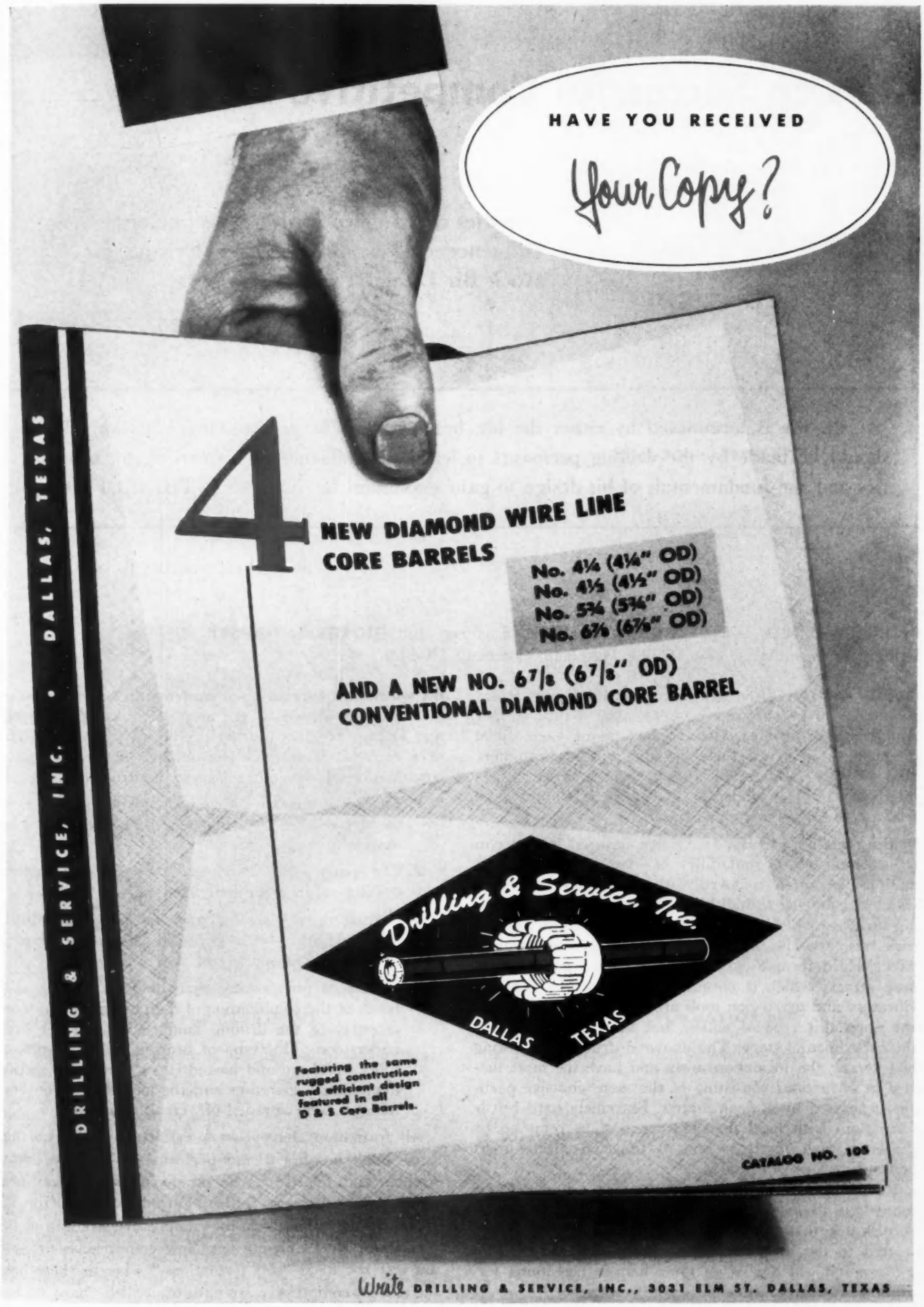
DEPTH	Hours Drilling	Hours Trips	Total Hours	No. Days	Cost at $1000 Per Day	No. Bits	Cost at $225	Total Cost
8000 to 11000	493	125	618	25.6	$25,600	25	$5,625	$31,225
11000 to 11500	202	60	262	10.9	10,900	10	1,115	12,015
	695	185	880	36.5	$36,500	35	$6,740	$43,240

With Oil Emulsion Mud

DEPTH	Hours Drilling	Hours Trips	Total Hours	No. Days	Cost at $1000 Per Day	No. Bits	Cost at $225	Total Cost
8000 to 11000	248	80	328	13.6	$13,600	16	$3,600	$17,200
11000 to 11500	65	24	89	3.7	3,700	4	460	4,160
	313	104	417	17.3	$17,300	20	$4,060	$21,360

Cost Difference

Without Oil	$43,240
With Oil	21,360
Savings With Oil Emulsion	$21,880


HAVE YOU RECEIVED
Your Copy?
DRILLING & SERVICE, INC. • DALLAS, TEXAS
4
NEW DIAMOND WIRE LINE CORE BARRELS
No. 4¼ (4¼" OD)
No. 4½ (4½" OD)
No. 5¾ (5¾" OD)
No. 6⅞ (6⅞" OD)
AND A NEW NO. 6⅞ (6⅞" OD) CONVENTIONAL DIAMOND CORE BARREL
Drilling & Service, Inc.
DALLAS TEXAS
Featuring the same rugged construction and efficient design featured in all D & S Core Barrels.
CATALOG NO. 105
Write DRILLING & SERVICE, INC., 3031 ELM ST. DALLAS, TEXAS

Keys to Successful Competitive Drilling

PART 2

A Series on Modern Drilling Technology—Influence of Formation Characteristics on Rock Bit Design.

Bit life is terminated by either the bit bearings and/or teeth. Therefore, an effort should be made by the drilling personnel to learn the influence of formation characteristics and the fundamentals of bit design to gain maximum bit footage. —THE EDITOR

By ROY A. BOBO, Director, **ROBERT S. HOCH,** Engineer, and **GEORGE S. ORMSBY,** Engineer, Drilling Engineering Division Phillips Petroleum Company, Houston

A KNOWLEDGE of the physical properties of the various formations to be encountered is essential for the proper application of drilling bits. Each type of each make rotary bit is designed for a specific type of formation. The purpose of this article is to present a better understanding of these properties and their relation to the selection of suitable bit types.

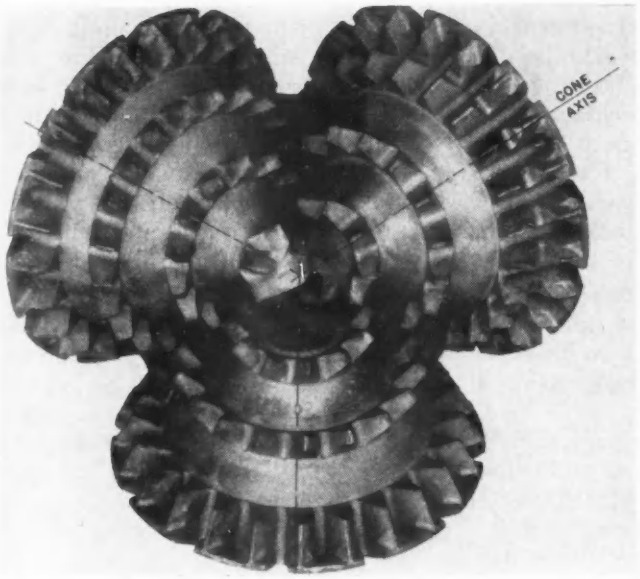
Drilling action of bits. Formation removal by bits can be accomplished in four different ways. The softest formations are often removed with a *scraping* action, of which the drag or fishtail bit is the classic example. Rolling-surface tooth-bits, which will be referred to here as rock bits, are also available with tearing and scraping effect. Hard formations are usually drilled with a *chipping* attack, which is obtained with rock bits. Various vibratory and percussion tools are also primarily dependent upon this type of action, but have not yet passed the experimental stage. The diamond drilling and coring bits *abrade* the formation away and have the most success in formations consisting of the more abrasive particles separated by a weak matrix. Extremely hard brittle formations with hard matrices can best be removed by *crushing,* such as the action of tungsten-carbide-insert "chert bits."[1]

Rock bits with chipping and scraping action drill far more hole than any other type of bit. This article will furnish information concerning the design of these bits as related to the properties of the formation drilled. This information will also be of some help in classifying formation properties from analyses of bit wear.

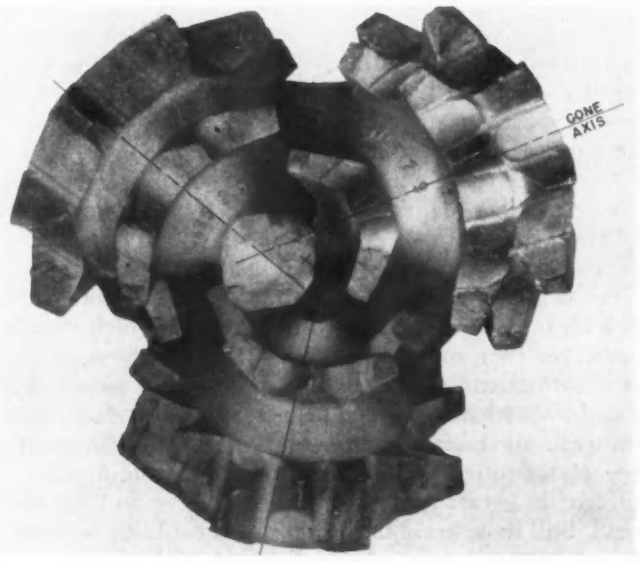
Bit wear and formation properties. The performance of a bit is measured by the average rate of penetration and footage obtained during the life of the bit. The life of a rock bit is normally terminated by any one or a combination of the four following occurrences:

1. The teeth on the rolling surfaces become worn to the degree that chipping or scraping action is seriously impaired.
2. The gauge surfaces become so worn that further drilling results in an undersized hole.
3. Bearing races becoming so worn that further drilling could result in a lost cone. The main cause is the abrasive properties of the drilling fluid.
4. Failure of pin bearing races due to spalling as a result of the combination of high bit loads and some property of the drilling fluid that is not yet fully understood. This type of bearing failure results in roller breakage and locked cones. Drill pipe torque immediately increases and the locked teeth on bottom are soon abraded off, creating a "flat."

All formations have two interrelated properties that affect rock bit design and performance—relative abrasiveness and relative hardness.[2] Formation abrasiveness refers to the property effecting rapid wear of the bit teeth. Hardness relates to the compressive strength of the formation. Rocks having very low compressive strength are referred to as "soft formations," whereas those having a high compressive strength are called "hard forma-

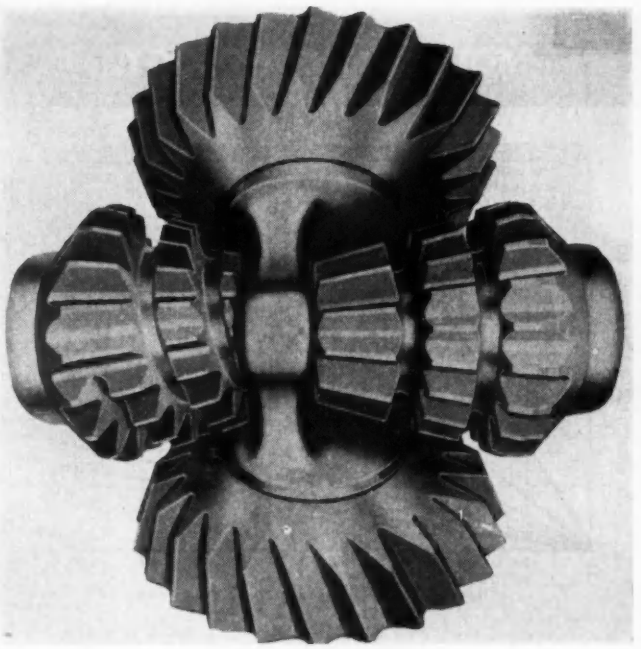


HARD FORMATION BIT

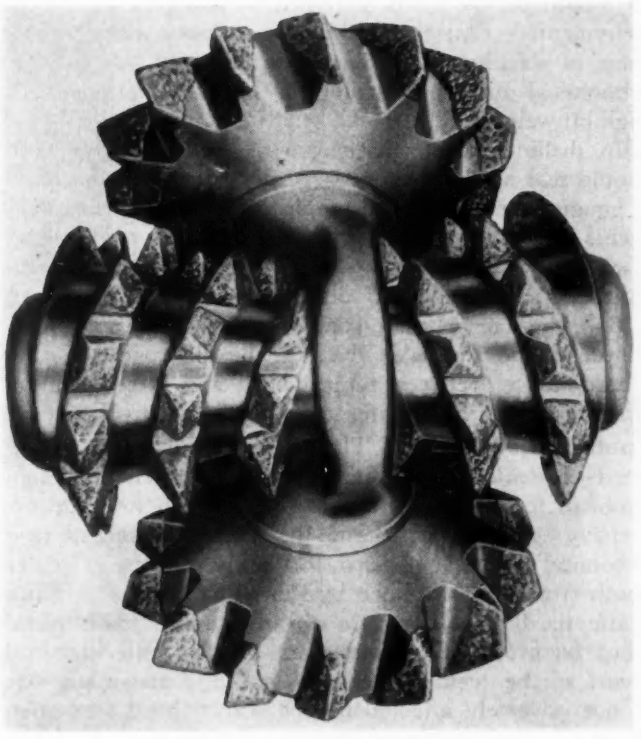


SOFT FORMATION BIT

Fig. 6—Difference in designs of hard and soft formation tri-cone bits.



HARD FORMATION BIT



SOFT FORMATION BIT

Fig. 7—Difference in designs of soft and hard formation cross-roller bits.

tions." Soft formations are also sometimes described as having more "plasticity" than hard formations.

Abrasiveness and hardness in rocks are related to the extent that extremely hard formations are usually made up of sharp granular particles which are quite abrasive. Soft formations may or may not contain these extremely abrasive particles. The more abrasive formations are indicated by cutter failure after only a few hours drilling.

Formation removal with rock bits. Hard and soft formation drilling requires rock bits of different design. For penetrating hard formations, sufficient force, or energy, must be applied to each individual bit tooth to overcome the compressive strength of the rock. When this threshhold energy is passed, the rock adjacent to the tooth literally explodes into chips.[1] In hard formations, where chipping action is the most efficient, any scraping and tearing action of the teeth on the formation quite often results in more damage to the teeth instead of faster

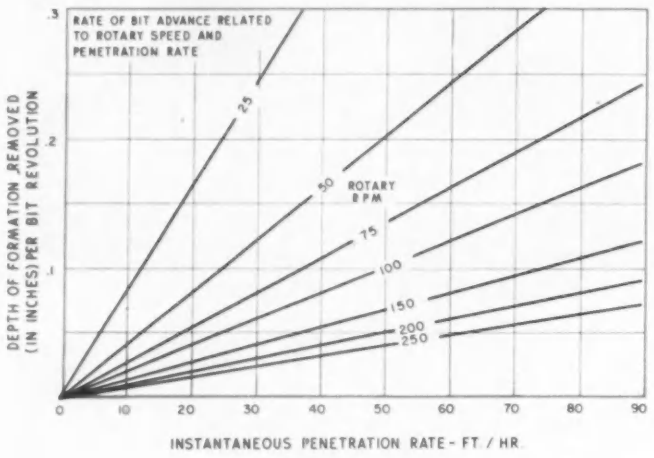


FIGURE 8

removal of the formation. This becomes more pronounced as weight on the bit is increased. It is highly important to remember that true-rolling bit surfaces with a minimum of scraping action become a necessity for the most economical rock bit drilling in hard formations with high bit weights.

In drilling soft formations with rock bits, the teeth should tear and scrape out large pieces of formation with a gouging action. To accomplish this, the moving segments of soft formation bits must not be true-rolling. Two-cutter and four-cutter bits approximate this requirement. In order to obtain the required scraping action, the axes of three-cone bits are skewed off center. Figure 6 and Figure 7 illustrate the differences, as discussed above, between typical hard and soft formation three-cone and four-cutter rock bits, respectively.

Tooth requirements. The tooth requirements for a hard formation rock bit constitute a difficult design problem for the manufacturers. The teeth must be extremely sturdy to withstand the heavy bit weights now becoming general in hard formation digging. Greater tooth strength is obtained by shortening the teeth. Since many hard formations are abrasive, more tooth metal must be provided to counteract the fast rate of metal wear, so the teeth are closely spaced. Penetration rate is not adversely affected by the stubby hard formation teeth. It has been found that the sharpness of the tooth angle means very little in hard formations with adequate drill collar weight. There is also little likelihood of burying the teeth to the cone and "floundering" the bit in hard formations with presently known drilling techniques. This is illustrated in Figure 8, which shows penetration per bit revolution for various rotary RPM and penetration rates per hour.

Shortening the teeth also permits a larger cone or cutter body. Part of this added diameter is used to increase the shell thickness. The remainder is used to increase pin, roller and race diameters for greater bearing capacity. These changes improve the ability of the bit to withstand higher loads associated with hard formation drilling.

Soft formation rock bits, in contrast with the hard formation types, have long slender teeth spaced far apart. This allows deep tooth penetration with a minimum of drill collar weight. It will also be noted from Figure 6 and Figure 7 that the arrangement of the teeth on the soft formation rock bits present easily cleaned surfaces so that the large chunks gouged and scraped out of the formation can be easily evacuated and balling of the bit minimized.

Intermediate bit types, such as medium-soft and medium-hard formation bits, merely compromise the basic design features of the hard and soft formation bits discussed previously. Unfortunately, a great deal of digging is in streaked or non-homogenous formations, such as a soft formation having inclusions of hard abrasive material, or a hard abrasive sand having soft, sticky shale streaks. Obviously, such conditions necessitate a modification between the extreme bit types.

Rock bit metallurgy. Differences in bit performance due to metallurgy will be encountered in the field between bits of different makes although they may appear almost identical to the uninformed. Various bit manufacturers use different types of steel, different heat treating and different hard facing procedures in the manufacture of their bits in an attempt to compound the best bits for specific drilling problems. The best bit must prove itself in the hole, but a little knowledge of the metallurgy involved will prevent wasted time trying out bits totally unsuited for the job at hand.

The importance of selecting rock bits having the best suited metallurgical properties for a given formation was recently demonstrated in a laboratory test. The drilling performance was compared between two rock bits almost identical to geometrical design and appearance but produced by different manufacturers. Each bit was used to drill the same formation under identical drilling conditions until one-fourth-inch of length was worn off the teeth. One bit made twice the footage of the other. Had this occurred in the field to a person totally unaware of metallurgical differences, the contrast in performance would have been attributed to a change in formation.

For drilling hard formations, the rolling members of a rock bit must be tough to withstand repeated high impact loads, yet they must also resist the abrasiveness of the hard formations. These two properties are usually obtained by casehardening and heat-treating all surfaces after the teeth are milled on the cone or cutter. The toughness of the original metal is thus retained and a hard surface is created for the bearing races and for the teeth. Still more resistance to abrasion could be obtained by applying tungsten carbide, or other hard surfacing materials, to the tooth surface if it were not for the extreme brittleness of these materials.[2] Under high impact loads on hard formations these surfacing materials flake off too rapidly to be of much benefit and may even shorten the tooth life. The only exception is that tungsten carbide on the gauge surface of rock bit teeth is of value even in the hardest formations.

On soft formation rock bits, tungsten carbide is applied to the tooth surfaces in numerous ways to achieve various effects. Application of a layer to only one side of a tooth causes a self-sharpening effect as the softer casehardened surface on the opposite side is abraded away. The material is sometimes applied to two, three and even all four sides of the teeth. The four-sided application is commonly

... now comes the BIG QUESTION

You've reached potential pay and cored the section. Now comes the big question — *pay out or play out?* . . . After thousands of dollars and months of effort have been spent to accumulate acreage, drill an exploratory well, and core a probable productive formation, sound business practice demands *good core analyses* . . . and the reliability of these data can be assured by the experience and technical background of the organization performing the work . . . If your best efforts deserve the best possible answer, take advantage of Core Lab's eighteen years' experience in all active areas.

CORE LABORATORIES, INC.

801 CORE STREET, DALLAS, TEXAS

CORE LAB

PETROLEUM RESERVOIR ENGINEERING

DALLAS, HOUSTON, CORPUS CHRISTI, MIDLAND, ABILENE, SAN ANTONIO, TYLER, TULSA, FT. WORTH, WICHITA FALLS, OKLAHOMA CITY, ARDMORE, PAMPA, ARKANSAS CITY, GREAT BEND, NEW ORLEANS, SHREVEPORT, HATTIESBURG, JACKSON, LAFAYETTE, DENVER, BAKERSFIELD, WORLAND, STERLING BILLINGS, CASPER, EL DORADO, LUBBOCK, FARMINGTON, LOVINGTON; CALGARY, EDMONTON, REGINA, CANADA; VENEZUELA, S. A.

used on bits that have not been casehardened. This results in maximum initial resistance to abrasion, but a blunt tooth edge is presented to the formation once the tip is lost.

Just as the geometry of bits must be compromised for intermediate formations, so must the hard surfacing. As an example, it is possible to obtain true rolling bits with short stubby teeth having tungsten carbide facing. Rock bits are often modified for problems peculiar to specific geographical and geological areas. An elementary knowledge of rock bit design and the formations will allow the men in the field to assist the bit manufacturers in selecting, modifying, and evaluating bits for the most economical performance.

TABLE 1

	GEOMETRIC DESIGN		METALLURGICAL	
Bit Type (Extreme)	Physical Proportion	Tooth Action	Rolling Member	Tooth Surface
Soft Formation	Long, slender teeth, widely spaced. Roller bearing capacity sacrificed.	Penetrates with sliding motion. Scrapes and gouges out formation.	Usually casehardened.	Hardfaced on one to four sides.
Hard Formation	Short, stubby teeth, closely spaced. Maximum bearing capacity.	Penetrates with minimum sliding motion. Shears out chips by overcoming compressive strength of formation.	Casehardened after teeth are formed.	Hardfaced on gauge surface only.

Summary. The varying characteristics of formations encountered in drilling make it necessary to understand and use rock bits of many different geometric and metallurgical design combinations. The types available range from those designed for soft, non-abrasive formations to those for hard, abrasive formations. The basic differences between the ideal extreme types are shown in Table 1.

When new areas are being drilled and bit performance becomes questionable, it is not unusual for a softer formation bit to be tried before it is found that a harder formation type is needed. The result is wasted bit cost and rig time. In these cases, a rudimentary knowledge of bit design and behavior as affected by formation characteristics will result in a better choice of bits based upon inspection of the bits pulled.

To obtain the maximum value from the bits, not only must the proper bit be selected, but the drilling technique must fit the bit type. This requires that drillers, as well as toolpushers, must be well acquainted with the whys and wherefores of bit design.

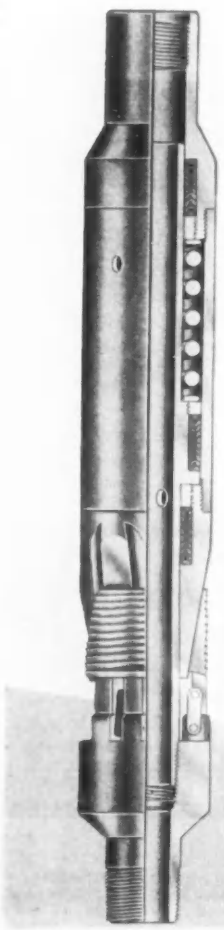
ACKNOWLEDGMENT

Acknowledgment is made to Hughes Tool Company and Reed Roller Bit Company for helpful information and for pictures shown herein.

REFERENCES

[1] L. L. Payne and W. Chippendale, "Hard Rock Drilling," *The Drilling Contractor*, June, 1953.
[2] F. L. Scott, "Hard Rock Rotary Drilling," *The Oil Weekly*, October 7, 1946.

Part 3 of this series in a coming issue.



NEW.

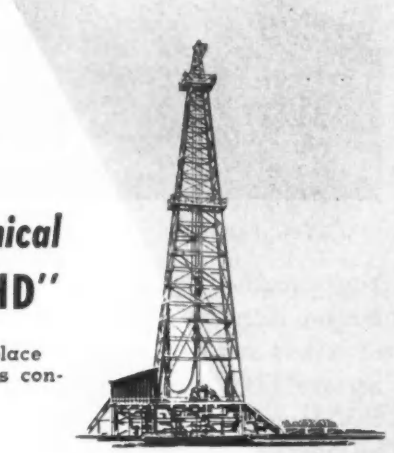
AMERICAN IRON *Hydraulic-Mechanical*
PACKER HOLDDOWN, Type "HD"

Use this new, American Iron tool to hold packer in place in those applications where pressure under packer is considerably greater than pressure above.

Especially recommended for . . .

- *High Pressure Acidizing*
- *Formation Fracturing*
- *Water Flood Input Wells*

Only packer holddown on the market that can be released without first equalizing pressures above and below packer.



AMERICAN IRON & MACHINE WORKS CO. MANUFACTURERS OF OIL FIELD EQUIPMENT A REG. U.S. PAT. OFF. OKLAHOMA CITY U.S.A.

PESA PARTNERS IN PETROLEUM PROGRESS

MANUFACTURERS OF DRILLING EQUIPMENT
• PRODUCTION EQUIPMENT • FISHING TOOLS • PUMP SPECIALTIES

Good Drilling Mud Practices

Continued from Page 170

in mud costs. At this same time the location of stock points was changed placing them in a higher drayage tariff range, which resulted in higher total mud costs.

Conclusions

1. Calcium base muds with a minimum concentration of low specific gravity solids have proven most effective in the Northwest Branch field.
2. Sodium carboxymethylcellulose has proven to be an invaluable mud additive for Gulf Coast drilling because of its weight suspension characteristics, wall building properties, and water loss control with a minimum concentration of low specific gravity solids.
3. Minimum active volume mud systems with adequate storage result in lower mud maintenance costs.
4. Storage and transferring of weighted muds has been effective in reducing costs and in providing additional mud for emergencies.
5. Penetration rates can be increased from two to three times by application of an oil emulsion mud.
6. Drilling bit footage can be extended from 1½ to 3 times by the use of an oil emulsion mud.
7. Minimum low specific gravity solid oil emulsion muds very effectively minimize the hazards of blowouts, lost circulation, stuck drill pipe and casing, and fishing jobs.
8. Cooperation of drilling crews in the application of good drilling practices has contributed much to the success of drilling in the Northwest Branch field.
9. A realistic savings of approximately $25,000 per well could be accomplished by the application of oil emulsion mud in addition to reducing many of the potential hazards of drilling.
10. Other operators mud costs per well in this area have been from two to three times higher than Sunray's costs, or approximately $50,000 as compared to $21,000.

ACKNOWLEDGMENT

The author gratefully acknowledges the assistance of J. R. Nichols, G. E. Hillhouse, and Keith Lindley, Sunray engineers, in the preparation of the figures and discussion in this article.

—The End

One of 46 new Higgins-built 65-ft. tugs.

Here are 3 reasons why *Higgins* can build 'em *faster, better, cheaper!*

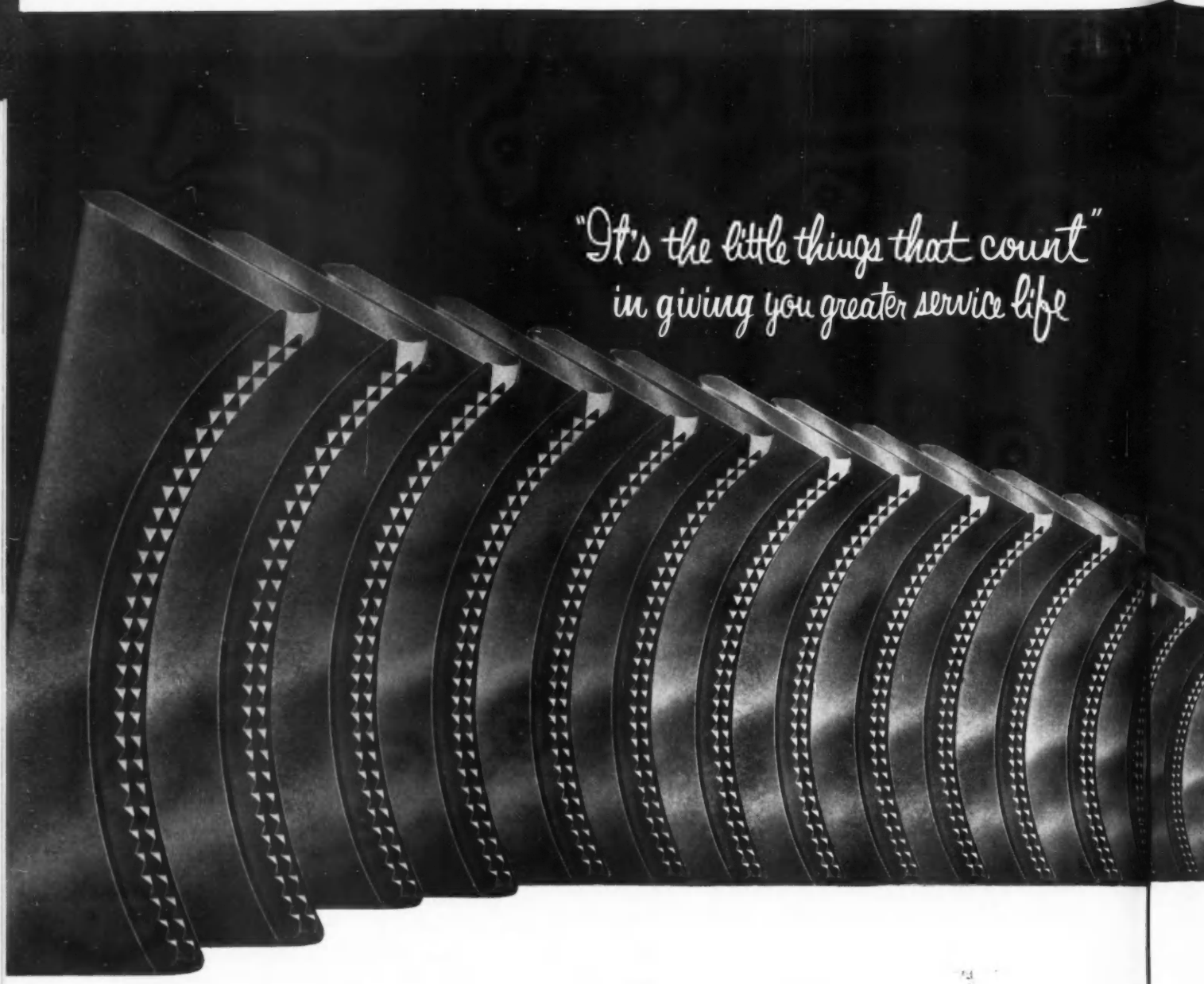
1. Recently, Higgins completed construction of 46 tugs which incorporate the *newest, most modern ideas in tugboat design.* Result? We have specialized "know-how" unequaled in the industry. So Higgins can give you a *better job.*
2. Because of this and other Higgins construction, we have jigs built and ready for tugs of all types. So Higgins can give you *faster delivery.*
3. By doing the job faster, labor and construction costs are cut to the bone. So Higgins can *save you money.*

No matter *what* your need—whether for tugs, tank barges, dredges or drilling equipment—the skill and equipment which mass-produced famed Higgins craft for World War II can give you service unsurpassed elsewhere. So before you order craft of *any* kind—be sure to *let Higgins bid!*

Q. Got a marine problem?
A. Get hold of
Higgins INC.
THE WORLD-FAMOUS BOAT BUILDERS
Box 8001 • New Orleans 22, La.
CRescent 0631

DRILLING BARGES • DREDGES • BARGES • QUARTER BOATS • TUGS • WORK BOATS • COMMUNICATION CRAFT • DRILLING STRUCTURES • PERSONNEL BOATS • PLEASURE BOATS • SEISMOGRAPH BOATS • BULK-TYPE CARGO BARGES • SWAMP SKIPPERS • TANK BARGES • ALSO MARINE REPAIRS OF ALL TYPES

(For more data on advertised products, use Readers' Service blue cards, last page this issue.)



Where Mission makes the difference

The next time you see a crew running pipe with Mission Rolling Dog Rotary Slips, watch how fast and smooth they work. The reason is that Mission long ago made a basic difference (an **exclusive** difference) in slip tooth design and construction with the Mission Rolling Dog Principle that insures a positive, instant grip . . . a smooth instant release. Yes, Mission Rolling Dog Rotary Slips fully encircle and support your pipe with a uniform, cushion-grip. The bite is firm and strong even for the longest strings, but Mission Rolling Dog Rotary Slips never cut or bottleneck pipe. Here's where Mission slip dogs get their bite. This is a special, automatic furnace in which the slip dogs are heat treated to add the proper hardness. After these "hot dogs" have been in the furnace the exact specified time, they are automatically lowered into a quenching bath. As a result of this carefully controlled step in the manufacturing process, Mission Slip Dog teeth give exceptionally long life and dependable service. The next time you buy rotary slips from your supply store, specify Mission. Mission Rolling Dog Rotary Slips are easier to handle, easier to service . . . make running and pulling pipe faster and safer.

Nothing but the finest will ever bear the name of

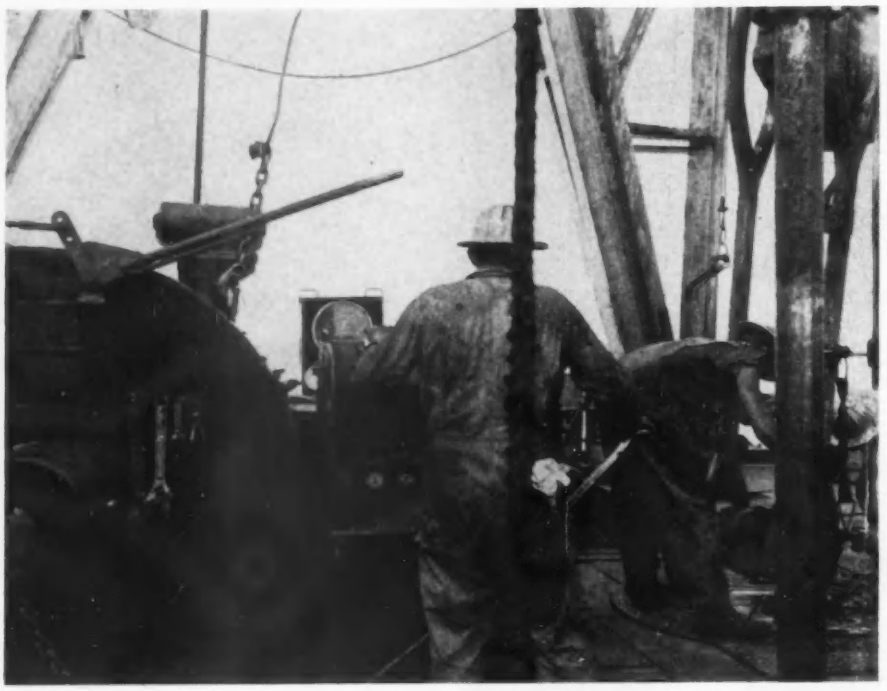
MISSION
MANUFACTURING CO.

P. O. BOX 4209 • HOUSTON, TEXAS

Export Office: 30 Rockefeller Plaza, New York

How to do it
DRILLING HINTS

$10 is paid for each illustrated acceptable contribution. Mail to The Editor, WORLD OIL, P. O. Box 2608, Houston 1, Texas.



Mount Small Hand Tools on Drawworks

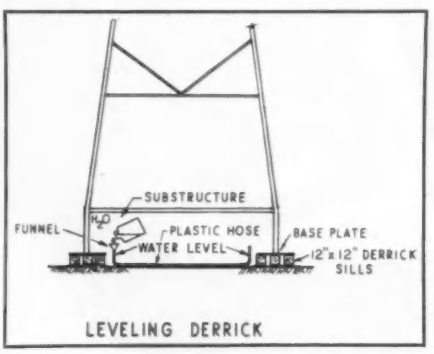
Make certain that the small hand tools frequently needed around the rig are readily accessible on the derrick floor. Weld small wall hooks made from bent pieces of welding rods to the cathead side of the drawworks near the driller's position. All small wrenches such as pliers, crescent wrenches, and screw drivers can be kept available for immediate use by any crew member.

This arrangement also permits the tool pusher to give periodic checks on small hand tools which are easily lost. At a glance a missing tool can be spotted, and the responsibility can be placed on the crewman last using the tool.

Plastic Hose Can Be Used As Substructure Level

One drilling contractor in the West Texas area uses a 30-foot length of plastic hose as a substructure level. The hose is stretched from one leg of the substructure to the opposite one. Water is poured in one end until hose is filled. The water level is visible through the plastic providing an ideal level to make certain that the substructure and derrick legs are level.

Leveling the substructure in this manner has extended the maintenance life of the diesel engines resulting in minimum "chain slap" and drive shaft crystallization. Level substructure increases engine life and reduces repair bills.



LEVELING DERRICK

Padded Deck on Pipe Buggy Provides Non-Skid Surface

When it is not convenient to insert the pipe buggy hook into the end of a point of pipe, there may be instances when it is best to carry it by resting the pipe end on top of the buggy. To facilitate handling, one company equipped the top of the pipe buggy with a deck made of two-inch plank and, atop this, nailed a coil of soft rope, as illustrated.

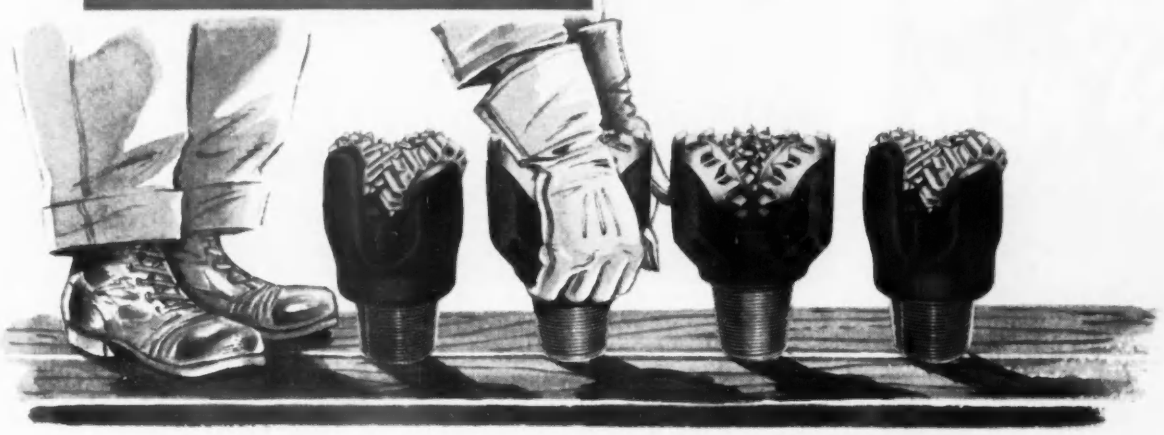
This coil serves the double purpose of providing a non-skid surface, preventing excessive slipping and provides a cushion for the threads, the latter bearing a large proportion of the weight of the full length of the joint when carried along in this fashion. The padded deck is easily installed and does not interfere with normal operation and handling of the hook in the conventional manner.

Tool Box and Work Bench Mounted on Common Skid

A major producing company in West Texas has fabricated a convenient field workshop out of scrap pipe. First a steel tool box was made of

When you're doing it

BIT by BIT



Comparisons between drillers' logs of wells drilled through the same formations has shown that, very often, drillers are getting greater footage with H. C. Smith Bits.

There's a reason for that!

you'll do it better with

H. C. SMITH BITS

H. C. Smith Bits are *built* to be better . . . designed and built by oil country men. Tooth designs are checked and proved in actual service, bodies are all-forged steel, cutter teeth are hard-faced, parts are selectively heat-treated for longer wear. And H. C. Smith Bits provide *triple*-bearing construction for longer service life.

Before buying your next bits, just check into the advantages you get with H. C. Smith Bits, in either 3-cutter or 4-cutter models. You'll see why so many drillers prefer them for making fast, straight, full gauge hole.

- every bit as good as the best

H C Smith
OIL TOOL CO.

GENERAL OFFICES, EXPORT OFFICES AND PLANT: COMPTON, CALIF.

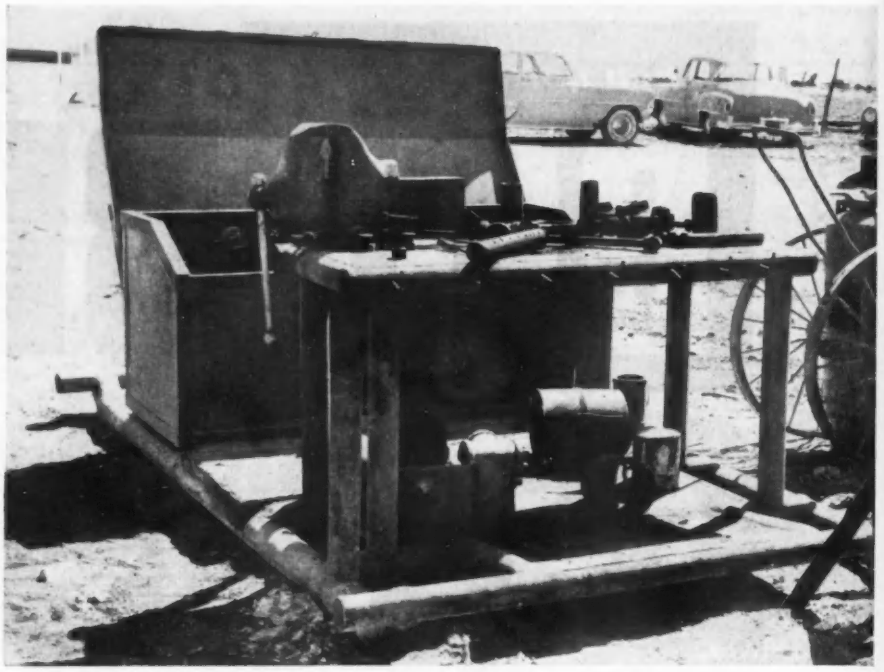
BRANCHES IN ALL PRINCIPAL OIL CENTERS IN THE UNITED STATES AND CANADA

Operates Easier, Faster

MUDWONDER®

NEW ROCKWELL BUILT MUD VALVE

Edward Valves, Inc.
Subsidiary of ROCKWELL MFG. CO.
1540 W. 145th STREET
EAST CHICAGO (phone 231)
INDIANA



angle iron and sheet steel with a hinged cover. Next the work bench was made of scrap four-inch pipe as framework for a steel top. A heavy pipe vise is bolted into position for use in breaking out connections and pipe threading.

The tool box was positioned on one end of the skid and the bench on the other. A board walkway was bolted to the pipe skids to prevent accidents. The short length of pipe extending vertically at the left hand corner of the skid base is for the electric light post.

Hinged Boiler Stack Facilitates Rig Moves

Removing two light bolts and pulling a steel pin is all that is necessary to dismantle the stack of the small heating boiler used for winter heating at the rig of a Canadian drilling contractor. If the move is to be a short one, however, where complete removal of the stack is not necessary, only two bolts need to be removed, for the pin then acts as a hinge, allowing the unit to be laid back and lashed to the top of the insulated housing built around the boiler.

Shown in the accompanying photograph, the unit is simple in its construction, requiring only the installation of two matching square collars that are welded to the upper and lower portions of the stack. The shop-made hinge segments, visible on the back side of the square plates, are of a design that is both simple and easy to install. When the hinge segments are welded in place, the pin hole may be drilled, thus assur-

POSITIVE CORROSION PROTECTION

Capital investment losses of costly equipment can now be controlled by the newly perfected Lambco Chemical Proof Enamel.

This new and amazing coating resists the destructive effects of nitric acid, picric acid, hydrochloric acid, brines, alkalies, refinery crudes, detergents and even a 50% solution of sulphuric acid.

Brushes or Sprays . . . Lambco Chemical Proof Enamel can be brushed or sprayed. Dries dust-free in 30 minutes and can be re-coated in 4 to 6 hours. Lambco Chemical Proof Enamel is easily applied on new or previously coated surfaces.

A Lambert Corrosion Engineer is as close as your telephone . . . just call our nearest office collect.

LAMBCO
CHEMICAL PROOF ENAMEL
A Product of
LAMBERT CORPORATION
HOUSTON
Austin • Dallas • Fort Worth • Tulsa
Harlingen • Oklahoma City

BE SURE

SAND-BANUM
REMOVES AND PREVENTS BOILER SCALE AND CORROSION

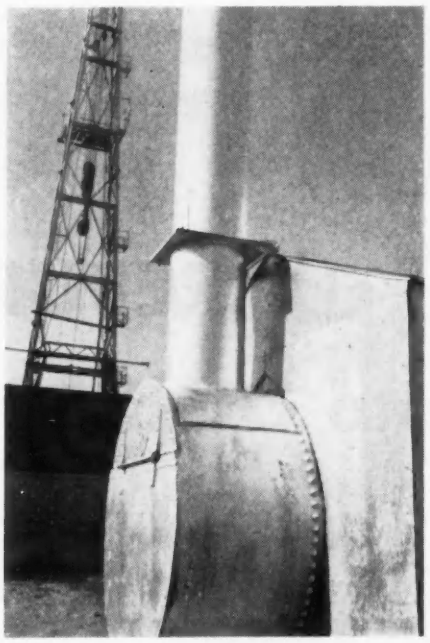
Ounces Only Once a Week

SAND-BANUM SPECIAL
TABLETS REMOVE AND PREVENT RUST AND SCALE IN ALL RADIATOR COOLING SYSTEMS

POWER GOES UP MAINTENANCE GOES DOWN

AMERICAN SAND-BANUM CO.
Established 1926
9 Rockefeller Plaza
New York 20, N.Y.

GOING FISHING? . . CALL YOUR FRIEND!
ACME
OIL TOOL COMPANY
• Competent Operators
• Rotary Fishing Tool Service
• Spang Cable Tools • Drill Pipe
• Blow Out Preventers • Rentals
• Complete Oil Field Machine Shop
ACME'S FISHING and RENTAL TOOL SERVICE IS COMPLETE!
OKLAHOMA CITY
Phone MElrose 7-2426
Affiliated Companies:
GREAT BEND FISHING TOOL CO.
Grent Bend 7810-7819
Liberal 3222
WICHITA FALLS FISHING TOOL CO.
Phone 3-1910
MFG · RENTALS · ENG
ACME
REPAIRS

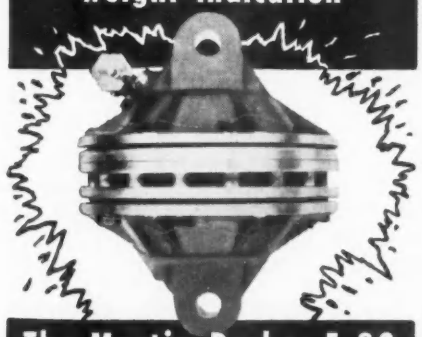


ing positive alignment for the single long pin. Likewise, holes for the two bolts on the front side of the plates may be drilled after installation to assure accurate alignment.

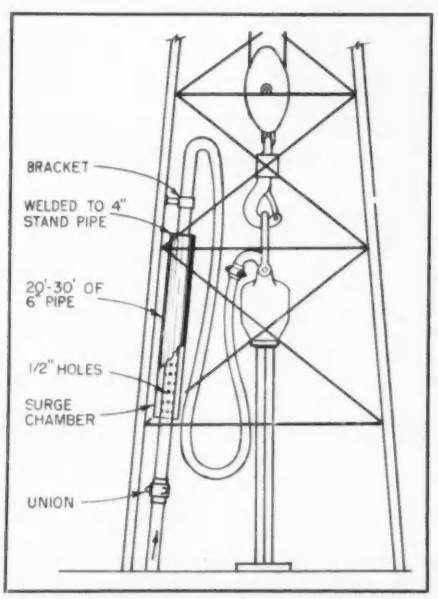
Rig and crew time saved at moving time through use of this type installation repays its cost many times over.

Slashes Down-Time
MUDWONDER®
NEW ROCKWELL BUILT MUD VALVE
Edward Valves, Inc.
Subsidiary of ROCKWELL MFG. CO.
1540 W. 145th STREET
EAST CHICAGO (phone 231)
INDIANA

Guaranteed friction-free weight indication



The Martin-Decker E-80
SENSATER
This new kind of diaphragm pressure transformer works with your Ideal Wire Line Anchor and transmits direct, no-lag, signals to your Martin-Decker Type "D" or "E" Weight Indicator.
The Sensater's amazing mobile diaphragm does not deflect, but moves with its backing plate to give a piston-like stroke without a friction-causing piston rod. Positively unaffected by temperature and fluid changes. Write for Bulletin P-10, Dept. B-8.
DISTRIBUTORS: T. J. Cullen, Bakersfield, California; Reed Roller Bit Co., Houston, Texas; Reed Roller Bit Co. of Canada, Ltd., Calgary and Edmonton, Alberta. Martin-Decker Weight Indicators and Ideal Wire Line Anchors are also sold through The National Supply Co., The National Supply Co. Export Division and other recognized supply houses.
MARTIN-DECKER CORP.
HOME OF THE WEIGHT INDICATOR — LONG BEACH, CALIFORNIA



Chamber on Standpipe Reduces Pressure Surges

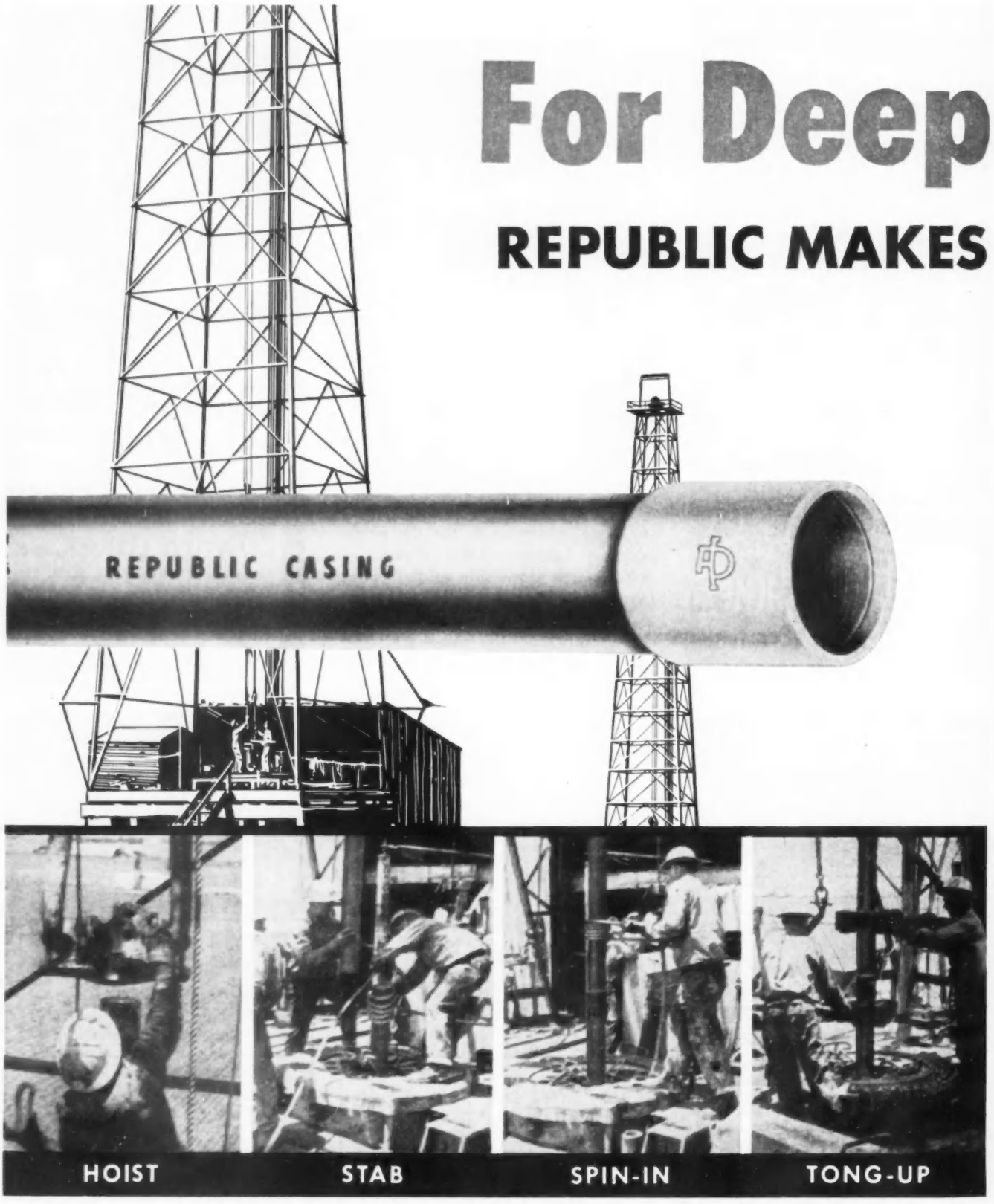
Southeastern Drilling Company has tried a new version of the technique of applying surge chambers. In an attempt to eliminate pressure surges causing a pulsating and swinging mud hose, a special closed chamber was

For POWER PISTON RINGS
HIGHLY DURABLE
FRANCE
To endure in critical operating conditions, Power Piston Rings must be engineered, produced to withstand constant pressure and develop greater power.
The Centrifugal Casting and "Heat Tensioning" methods used by France have proved: here are Piston Rings that assure you longer life and efficient oil control with no warping or loss of tension in service.
SPECIFY FRANCE POWER PISTON RINGS
Write for Complete Information
MAXIMUM SERVICE for you in our NEW PLANT
FRANCE PACKING COMPANY
9925 Bustleton Ave., Philadelphia 15, Pa.

(For more data on advertised products, use Readers' Service blue cards, last page this issue.)

For Deep

REPUBLIC MAKES



24-page picture booklet takes you on quick trip through Republic's new seamless mill. Ask for No. ADV 595.

Republic Casing and Tubing make up quickly. Straight lengths together with uniform roundness mean quick, easy stabbing. Clean, accurate threads spin in and tong up fast. And uniform depth of steel under thread roots guards against pullouts—gives full protection in the hole. To save time and money, specify Republic.

or Shallow Wells

BOTH ELECTRIC WELD and SEAMLESS CASING and TUBING

Specifically, what does this mean to you in the oil business?

It means that when you purchase Republic Electric Weld or Seamless Casing and Tubing you're assured of the same high quality throughout the string—quality that has earned an outstanding reputation in the oil industry throughout the world. The reason is clear. Oil producers know they're protected by Republic's rigid quality controls—that Republic strings are dependable, economical.

Republic's Normalized Electric Weld Casing and Tubing, widely used in every field for the past 25 years, are available in grades H-40 and J-55. Sizes range from 2⅜" through 13⅜" O.D.

Republic Seamless Casing and Tubing, newest additions to the line, are second to none in the industry. They're produced at the world's most modern seamless mill, employing the latest precision equipment and techniques—made in grades J-55 and N-80. Sizes range from 2⅜" through 9⅝" O.D. For complete information, call your nearest Republic Pipe Distributor. Or write to:

REPUBLIC STEEL CORPORATION
GENERAL OFFICES • CLEVELAND 1, OHIO
Export Department: Chrysler Building, New York 17, New York

REPUBLIC CASING AND TUBING
Electric Weld and Seamless

Other Republic Products include Line Pipe—Steel and Plastic Pipe—Carbon, Alloy and Stainless Steels—Studs, Bolts and Nuts—Heat Exchanger Tubes

fabricated on the standpipe which greatly reduces fatigue.

The idea was to provide a closed chamber to absorb the surges commonly passed to the hose. A joint of 6-inch pipe was welded to the 4-inch stand pipe, after one-half-inch holes had been drilled in the 4-inch as shown in the diagram. End plates were welded to seal off the annular space between two pipes. The chamber acted as a fluid cushion to reduce surges.

Hammer Device on Sign Makes Installation Easy

A unique but practical road sign having its own built-in hammer for quick, easy installation is being used by Santa Fe Drilling Company, a California drilling contractor. Set up at road intersections to direct service companies to the location where the rig is operating, the sign consists of a length of sucker rod material to which is attached the two-sided sheet steel painted sign. A salvaged reamer cutter is slipped onto the post below

the sign and, below it, at a point several inches above expected ground level, is welded a large nut.

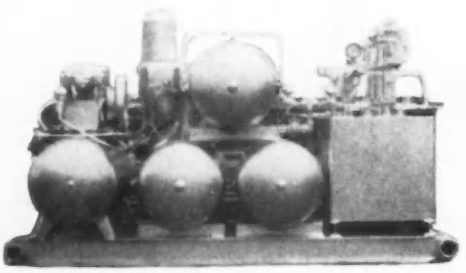
To install the sign, the reamer cutter is pounded down hard against the welded nut several times until the sign post is buried to the desired depth. Left on the post, the cutter provides desirable weight to the lower part of the sign, making it less likely that it will be blown over by wind.

NEW

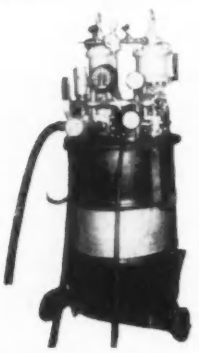
MOST PROTECTION EVER OFFERED A DRILLING RIG

KOOMEY

Blowout Preventer Closing Unit



CUSTOM TYPE SERIES



DRUM TYPE SERIES

From 2-to-4 individual motors and pumps on each Model—to offer a rig DOUBLE, TRIPLE and QUADRUPLE protection.

Proven in field tests for over two years to be the most EFFICIENT, DEPENDABLE and SIMPLEST unit of its type ever offered the oil industry.

TANK TYPE SERIES

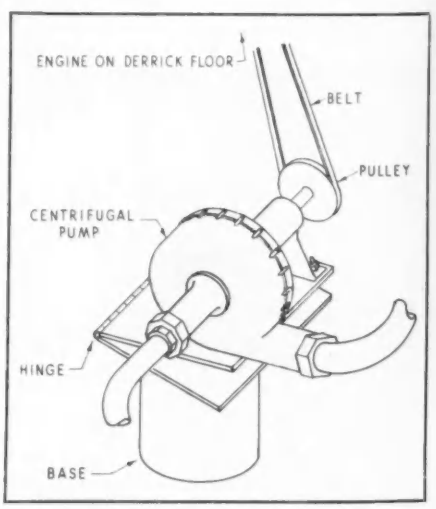
Call—Wire—Write

STEWART & STEVENSON

Blowout Preventer Closing Unit

1718 Congress (BL-5341) Box 1637

HOUSTON, TEXAS



Constant Belt Tension Improves Pump Efficiency

Laughlin and Porter Drilling Company of Midland, Texas, has devised a method whereby the centrifugal pump supplying water for the rig cooling system and braking mechanism can be mounted on a hinged base below the derrick floor permit-

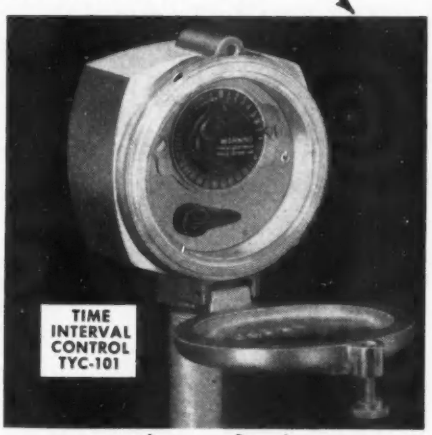
Seals Drop Tight

MUDWONDER®

NEW ROCKWELL BUILT MUD VALVE

Edward Valves, Inc.
Subsidiary of ROCKWELL MFG. CO.
1540 W. 145th STREET
EAST CHICAGO (phone 231)
INDIANA

Here it is . . . . . ↘



ROACH *Heavy-Duty* TIMERS

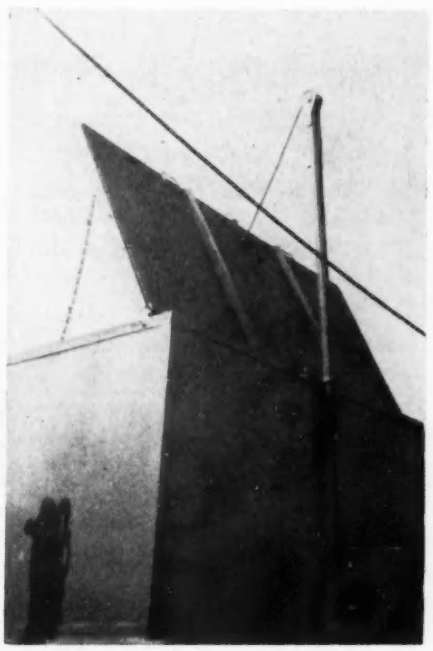
★ DEPENDABLY ACCURATE
★ JEWELED MOVEMENT
★ HEAVY-DUTY MERCURY SWITCH
★ HEAVY-DUTY WEATHER-TIGHT CASE
★ COMPACT INSTALLATION
★ ONE-KNOB OPERATION

Write for our new bulletin #101

ROACH EQUIPMENT CO.
801 W. 23 ST. . . . TULSA, OKLA.
P. O. BOX 1067 . . . DIAL 5-1259

ting substantial savings to the contractor.

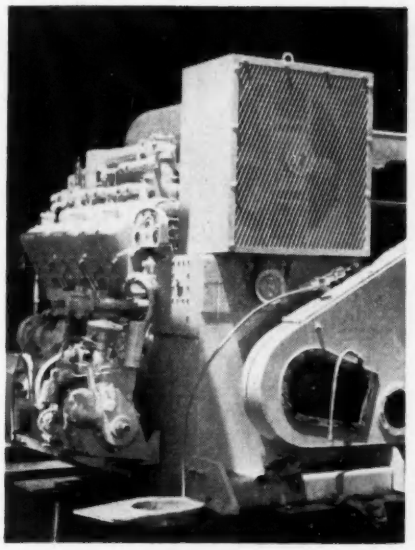
The centrifugal pump is welded on a three-eighths-inch steel base, hinged at one end in a manner to allow the weight of the centrifugal pump and its base, to effect a constant tension on the V-belt driven by an engine on the derrick floor. In this way, as the belt becomes stretched with use, the dead weight of the pump and the freedom of motion in the hinged joint will keep a constant tension on the belt. Improved efficiency of the pump and far less belt slippage for long periods of sustained operation are the main advantages.



Pulley-Counterweight Aids in Lifting Bin Lid

A pulley-counterweight arrangement can ease the chore of lifting the heavy lid of a bin where tool and machine parts are stored. These bins are common around rigs where exposure to weather causes parts to rust quickly. Usually the lids of such bins are heavy and hard to handle.

To ease the task, fasten to the back of the bin a 2-inch pipe twice the height of the bin. Attach a pulley to top of the pipe. Then fasten a line to the front edge of the top of the bin, run the line through the pulley and attach it to the counterweight as shown.



How to
GET MORE CONTRACTS
MAKE MORE MONEY
PER CONTRACT!

Install Twin Disc Disconnecting Fluid Power Take-Offs on your drilling rigs, and you'll make *faster, lower-cost hole by reducing mechanical downtime.*

Through *elimination* of mechanical connection, these Twin Disc *fluid* drives *prevent* engine lugging, shock loads, overloads, and twist-offs. Full engine torque is put to work *continuously.* Drilling, hoisting and pumping operations are *smoother, steadier.*

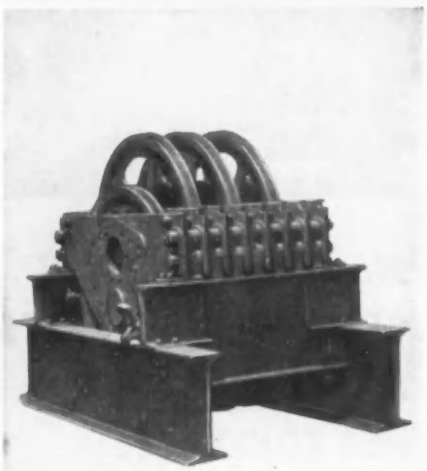
Disconnecting Fluid Power Take-Offs are available in Models 21 HUD-0 and 27 HUD-00. *Write Twin Disc today for new Bulletin No. 506!*

(Above) Twin Disc Disconnecting Fluid Power Take-Off, shown mounted on LeRoi L-3000 engine powering Emsco Mud Pump on Mid-Continent Rig.

TWIN DISC
CLUTCHES AND HYDRAULIC DRIVES
TWIN DISC

TWIN DISC CLUTCH COMPANY, Racine, Wisconsin
Hydraulic Division, Rockford, Illinois

STANDARD
OF THE
PETROLEUM INDUSTRY
Since 1905



Regan *type AN55*

CROWN BLOCK

. . . built to stand up under the line speeds and loads applied by the largest drilling rigs. Ball bearings have been used to carry the thrust loads and further reduce the side drag on the sheaves. Heavy roller bearings carry the radial loads. The basic Regan design of a rotating inner race ring has been kept but the inner race ring of the roller bearings is mounted on the sheave hub. A bolt through the sheave hub pre-loads the ball thrust bearings and removes all side play from the sheaves. Positive lubrication to each bearing. Capacity—600 tons. *Write for informative bulletin.*

53

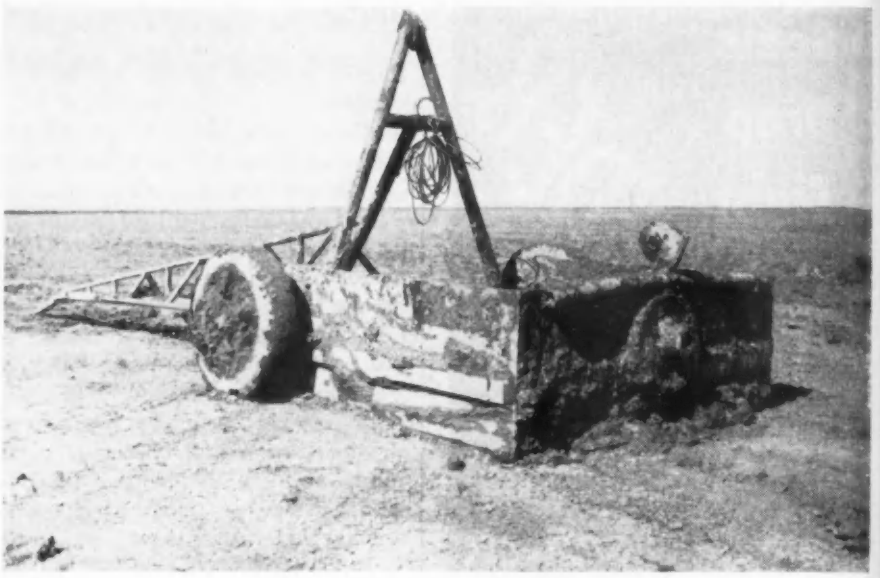
Regan

Forge & Engineering Co.

SAN PEDRO, CALIF.
FORT WORTH, TEXAS

Exclusive Mid-Continent and Export Distributor:
MID-CONTINENT SUPPLY CO.
General Offices: Fort Worth, Texas

Quality
–Wrought on the Forge of Experience



Mud Buggy Speeds Drying Operation

Cleaning up the location after the drilling rig has been moved off frequently is delayed for a number of days due to the slow drying-out of the mud still remaining in the pits and waste sumps. To speed up this operation, one company has devised a two-wheel, fresno-like buggy which can be pulled by a tractor through the sump and carry out the still-wet mud. Once out on level ground, the mud may be spread out in a thin layer where it will dry rapidly, after which the sump then can be filled in and the ground leveled.

The ruggedly-built, pneumatic-tired buggy has an 8 by 8 by 3 foot box which is made of reinforced steel plate. It is equipped with a 22-foot tongue (measured from the axle) made of 4½-inch drill pipe strengthened with a cantilever-type structure of two-inch pipe. A triangular stiff-leg also made of drill pipe, and measuring eight feet from axle to apex, is mounted over the axle and made an integral part of the tongue. A pulley is mounted on top of the stiff leg and another on the upper edge of the rear portion of the box. A wire line, passed through these two pulleys and on over to the tractor winch makes it possible for the operator to easily up-end the box and, while the unit still is moving, spread the mud in an even layer over the ground adjacent to the mud pit.

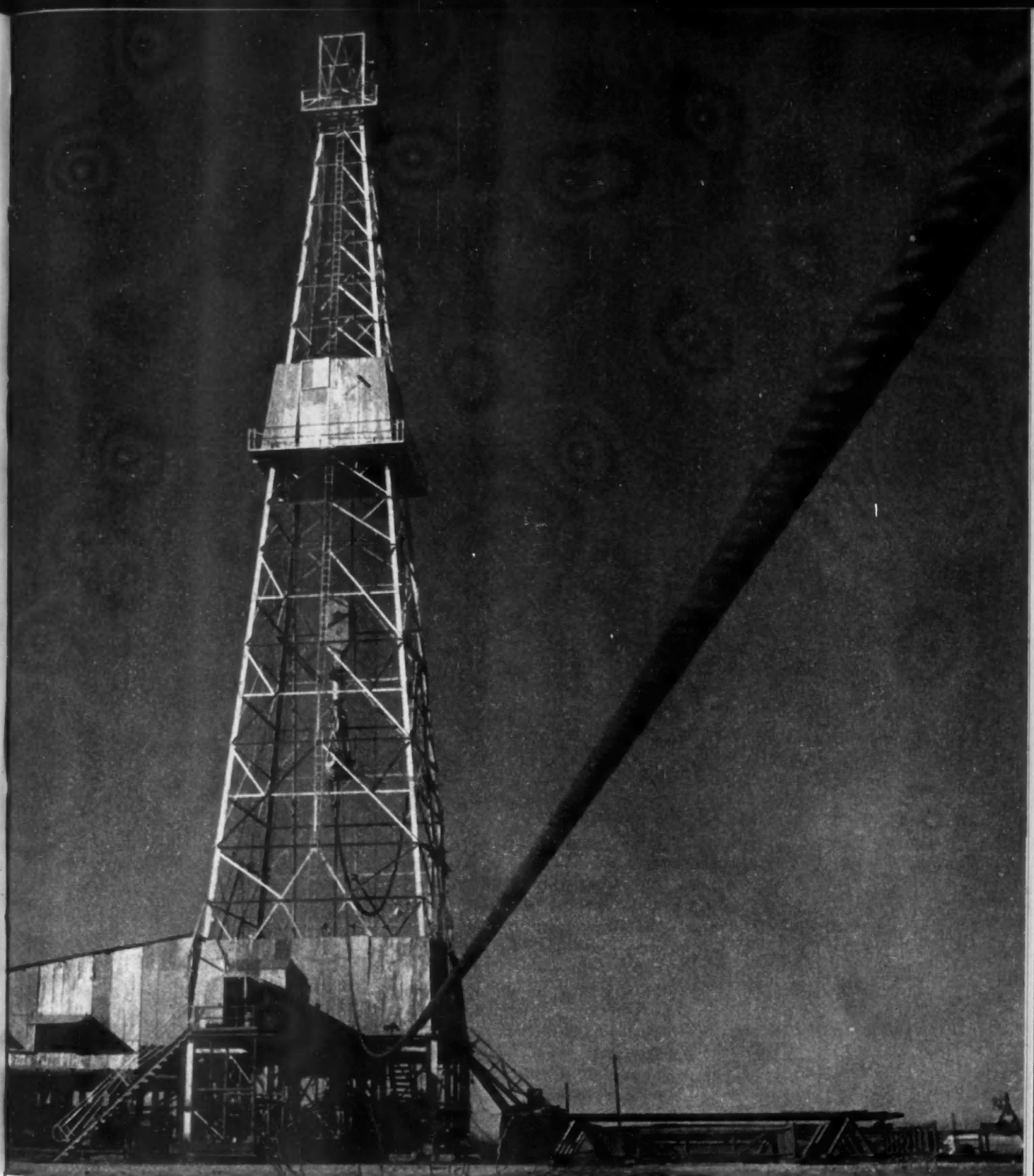
Use of the buggy assures the operator of the property that the pits, when finally filled in with dry mud, will remain level with the surrounding ground and not sag and require

Assembles Easily

MUDWONDER®

NEW ROCKWELL BUILT MUD VALVE

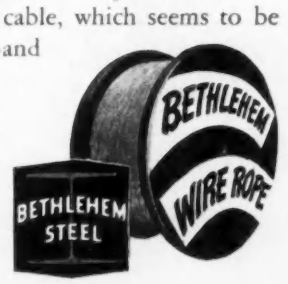
Edward Valves, Inc.
Subsidiary of ROCKWELL MFG. CO.
1540 W. 145th STREET
EAST CHICAGO (phone 231)
INDIANA



Wire Rope at Work—This big outfit was photographed in the Wickett Field of West Texas while drilling was going on at approximately 13,000 ft. The well was completed at a total depth of 15,810 ft. Owner of the rig is the Zephyr Drilling Corporation of Tulsa, Okla.

To Bethlehem wire rope were entrusted duties of major importance. Purple Strand Form-Set (preformed) was used as rotary line, and it easily handled the weight of the drill pipe. The "safety-slide" cable, which seems to be shooting right out of the picture, was also a Bethlehem line. Responsible assignments—and here, as always, the Bethlehem ropes met every requirement with plenty to spare.

Bethlehem Steel Company, Bethlehem, Pa. On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation



Mill depots and distributors from coast to coast stock Bethlehem rope for the following industries and numerous others:

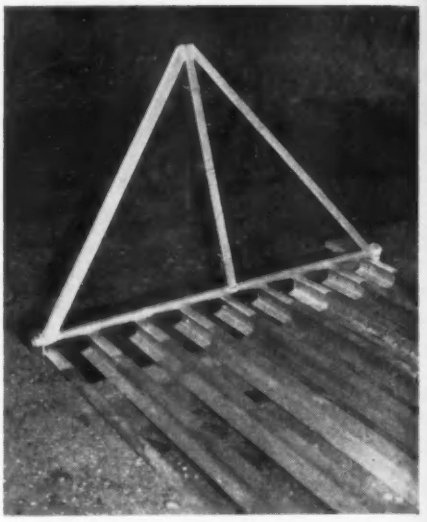
PETROLEUM • MINING • CONSTRUCTION • EXCAVATING • QUARRYING • LOGGING • MANUFACTURING

subsequent refilling, as might be the case if wet mud were left in the bottom of the pit. In addition, such a procedure enables the dozer operator to replace top soil at the top of the pit, making for better relations with the farmer who later will work the ground and plant with crops.

Collapsible Cattle Guard Can Be Easily Moved

On wildcat locations where, in the event of a dry hole, it may be necessary to move off, clear the ground and replace fences, cattle guards that can be taken up easily and moved for re-use at another location are desirable. The guard illustrated in the photograph is one which answers these conditions, yet is relatively inexpensive to build.

The side members are so designed that they can be folded down inward to lie flat on the rails, forming a compact easy-to-load package. The side guard structure is made of two-inch angle iron and is welded to a horizontal length of pipe which rotates inside ears welded to each corner of the guard. The center, vertical member serves as a convenient post to which the barbed wire fence ends can be attached, thus eliminating need for setting an additional post at either side of the guard for that purpose. The rails are welded to flat steel plates which, in turn, are secured to the heavy timbers which span the shallow ditch.



LOCK THE DOOR *BEFORE* *THE HORSE IS STOLEN!*

KNOW when you lose mud...

with "*Pit-O-Graf*"

The Pit-O-Graf chart shows the instant lost circulation begins by recording a decrease in mud pit level. It enables action to be taken at once, while there is still time. An increase of mud in the pit, which is shown immediately on the chart, means gas or salt water. The crew has time to take action to avert a blowout. Pit-O-Graf is a completely automatic recording instrument which measures the mud pit level. With the recording unit right before the driller, he is aware at once of any increase or decrease in mud volume. Pit-O-Graf allows preventive action to be taken at once. You need Pit-O-Graf in lost circulation areas and for every wildcat.

WARREN AUTOMATIC TOOL CO.

Manufacturers of Mud-O-Graf and Rig Runner.

Houston	Odessa	Lake Charles	New Iberia	Harvey
CHarter 4444	6-5861	6-2265	2-7131	Edison 3721

Export Representative: International Oil Equipment Co.
30 Rockefeller Plaza, New York City

Light Mounted on Skid Base Gives Maximum Illumination

A West Texas drilling contractor has mounted his rig lights to the skid base of the diesel electric unit to provide maximum illumination around the rig. A short three-inch pipe welded vertically to the base provides a means of inserting the moisture-proof light standard. This eliminates the task of erecting tall light standards with guy wires attached.

GULF'S TIMBALIER BAY FIELD HEADQUARTERS. Buildings are on pilings. The principal part of the field fringes the Gulf of Mexico (background) about two miles to the right.

A pictorial tour of Timbalier installations starts on Page 202.

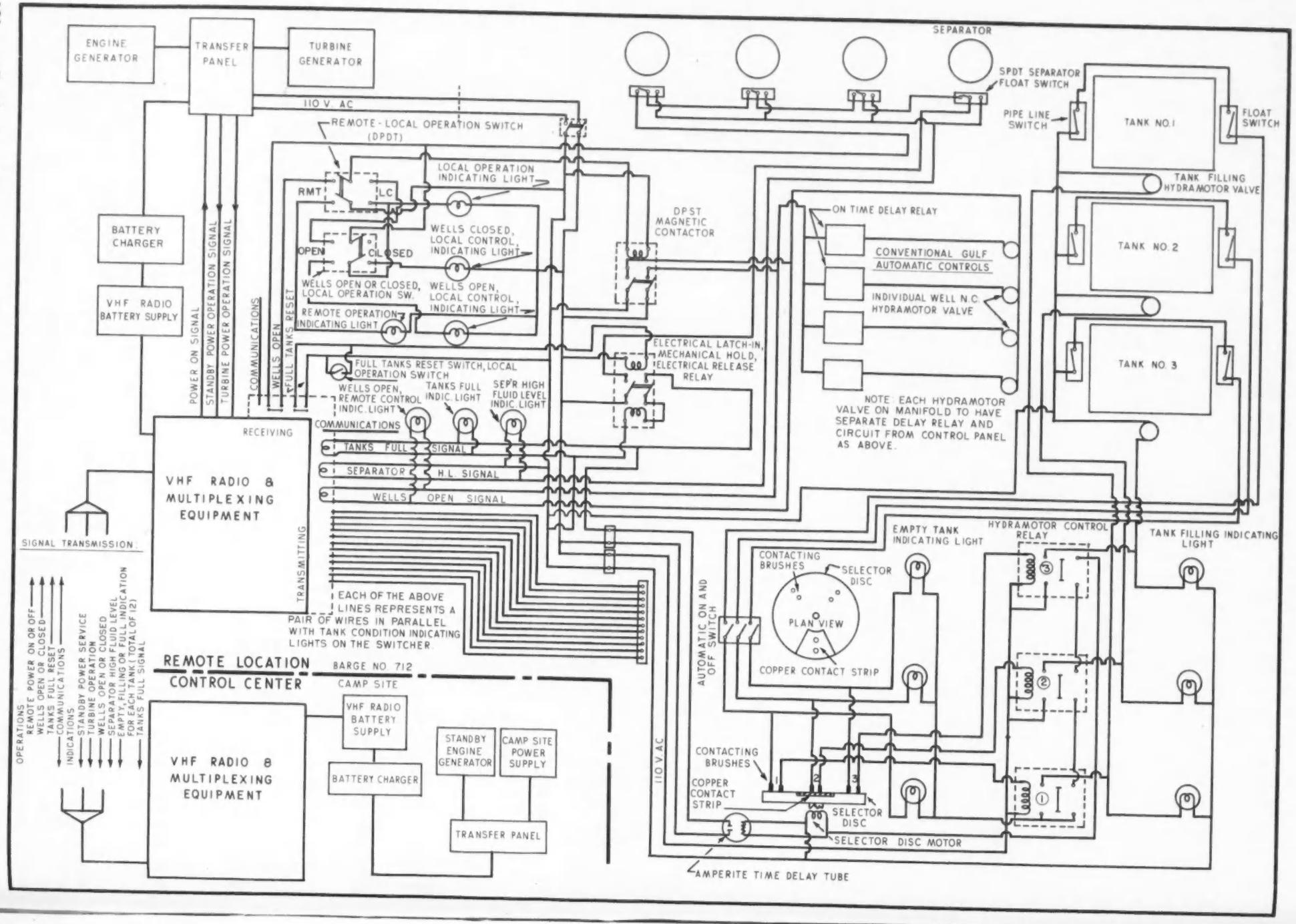
This Producing Lease Is Controlled Automatically From Remote Station

Gulf Refining Company uses radio signals to control and supervise its marine operations at Timbalier Bay, Louisiana.

By J. E. KASTROP, WORLD OIL Staff

PUSH A BUTTON in a central office and all the flowing wells in a lease located miles away are shut in. Push another button and the wells begin to flow again. Indicating lights on a small control panel at this same central office tell precisely what is happening in the field many miles away. These are but a few samples of what can be done by a new automatic remote control system Gulf Refining Company has installed at its Timbalier Bay field fringing the Gulf of Mexico 60 miles south of New Orleans.

This versatile new system incorporates high frequency radio transmission with a unique method of automatic tank battery and production


ENGINE GENERATOR
TRANSFER PANEL
TURBINE GENERATOR
110 V. AC
REMOTE - LOCAL OPERATION SWITCH (DPDT)
RMT
LC
LOCAL OPERATION INDICATING LIGHT
OPEN
CLOSED
WELLS CLOSED, LOCAL CONTROL, INDICATING LIGHT
WELLS OPEN OR CLOSED, LOCAL OPERATION SW.
WELLS OPEN, LOCAL CONTROL, INDICATING LIGHT
REMOTE OPERATION INDICATING LIGHT
BATTERY CHARGER
VHF RADIO BATTERY SUPPLY
POWER ON SIGNAL
STANDBY POWER OPERATION SIGNAL
TURBINE POWER OPERATION SIGNAL
COMMUNICATIONS
WELLS OPEN
FULL TANKS RESET
FULL TANKS RESET SWITCH, LOCAL OPERATION SWITCH
WELLS OPEN, REMOTE CONTROL INDIC. LIGHT
TANKS FULL INDIC. LIGHT
SEP'R HIGH FLUID LEVEL INDIC. LIGHT
COMMUNICATIONS
TANKS FULL SIGNAL
SEPARATOR H.L. SIGNAL
WELLS OPEN SIGNAL
RECEIVING
TRANSMITTING
VHF RADIO & MULTIPLEXING EQUIPMENT
SIGNAL TRANSMISSION
EACH OF THE ABOVE LINES REPRESENTS A PAIR OF WIRES IN PARALLEL WITH TANK CONDITION INDICATING LIGHTS ON THE SWITCHER.
OPERATIONS
REMOTE POWER ON OR OFF
WELLS OPEN OR CLOSED
TANKS FULL RESET
COMMUNICATIONS
INDICATIONS
STANDBY POWER SERVICE
TURBINE OPERATION
WELLS OPEN OR CLOSED
SEPARATOR HIGH FLUID LEVEL
EMPTY, FILLING OR FULL INDICATION FOR EACH TANK (TOTAL OF 12)
TANKS FULL SIGNAL
REMOTE LOCATION CONTROL CENTER
BARGE NO. 712
CAMP SITE
VHF RADIO & MULTIPLEXING EQUIPMENT
VHF RADIO BATTERY SUPPLY
BATTERY CHARGER
STANDBY ENGINE GENERATOR
CAMP SITE POWER SUPPLY
TRANSFER PANEL
SEPARATOR
SPDT SEPARATOR FLOAT SWITCH
PIPE LINE SWITCH
TANK NO. 1
FLOAT SWITCH
TANK FILLING HYDRAMOTOR VALVE
TANK NO. 2
TANK NO. 3
DPST MAGNETIC CONTACTOR
ON TIME DELAY RELAY
CONVENTIONAL GULF AUTOMATIC CONTROLS
INDIVIDUAL WELL N.C. HYDRAMOTOR VALVE
ELECTRICAL LATCH-IN, MECHANICAL HOLD, ELECTRICAL RELEASE RELAY
NOTE: EACH HYDRAMOTOR VALVE ON MANIFOLD TO HAVE SEPARATE DELAY RELAY AND CIRCUIT FROM CONTROL PANEL AS ABOVE.
EMPTY TANK INDICATING LIGHT
HYDRAMOTOR CONTROL RELAY
TANK FILLING INDICATING LIGHT
CONTACTING BRUSHES
SELECTOR DISC
PLAN VIEW
COPPER CONTACT STRIP
AUTOMATIC ON AND OFF SWITCH
110 V. AC
SELECTOR DISC MOTOR
AMPERITE TIME DELAY TUBE

SCHEMATIC DIAGRAM of Gulf's automatic controls coupled with VHF radio. Complete supervision over a lease many miles distant can be exerted from a central office. Only three stock tanks are indicated on this diagram. However, the system at Timbalier Bay includes six storage tanks.

supervision. The VHF radio transmits instructions to the automatic control system in the field. These instructions are carried out immediately, and the results are relayed back to the central office via radio. In addition to transmitting supervisory and control signals via high frequency radio, voice communications are carried also from the field to a central office located miles away.

Basic idea. The basic idea of the field control and supervisory system stems from Gulf's development program in automatic production equipment since 1947. The fundamental idea of a supervisory circuit is illustrated in Figure 1. This is a simple case, consisting of one flowing well, one separator and one stock tank.

The well is equipped with a motor valve on the flow line. It is electrically operated and is normally closed when not energized. This is a very important feature in any electrically-operated automatic control system for oil production.

The separator is equipped with a float switch which breaks contact when the liquid level reaches the danger point of overflowing or carrying fluids into the gas line. The stock tank also contains a similar float switch which breaks contact when the tank becomes filled. A pipe line connection to this tank includes an electrical switch which is actuated by the valve. When the valve is closed, the switch is closed. When the valve is opened, the switch is opened, thereby breaking electrical contact.

Thus, there are three supervisory stations in this theoretical one-well lease. In each case, the supply circuit to the motor valve on the well flow line is broken, thereby shutting the well in. And, the well will remain closed in until all supervisory stations are back to their normal operating position, that is, the separator liquid level below the danger point, the stock tank liquid level below the full mark and the pipe line valve closed.

The Robertson switcher. This supervisory system becomes a little more involved when several wells, more separators and additional stock tanks are included. If it is desired to maintain production on a 24-hour per day basis, there must be adequate storage in the form of stock tanks. To prevent all the wells from being shut in when the first tank is filled, some means must be provided to stop the flow of oil into that tank and divert the flow into a tank which is not full. This meant that an electric motor valve, similar to the one installed in each well flow line, had to be installed in the fill line to each tank. And, more important, a tank switching device had to perform the function of closing in a full tank and opening the fill line on the next empty tank to insure continuous flow from the producing wells.

A unique device which is the nerve center of the present Timbalier Bay installation does the job of selecting an unfilled tank, closing the fill line valve on the full tank, and opening the fill line valve on the selected empty tank. It is called the Robertson Electric Tank Switcher, named after its inventor and designer, M. L. Robertson of Gulf's East Texas Zone headquarters at Kilgore.

This device consists of a rotating plastic disc into which has been inserted a copper contacting strip. A small electric motor drives this disc at a speed of one revolution per minute. Mounted immediately above this rotating selector disc is another insulated circular plate which remains stationary. Pairs of contact brushes are mounted into this stationary plate so that the brushes slide over the rotating selector disc. For every stock tank in the system, there is a pair of contact brushes mounted side by side. The control circuit to the fill line valve motor is completed when the brushes contact the copper contact strip in the selector disc.

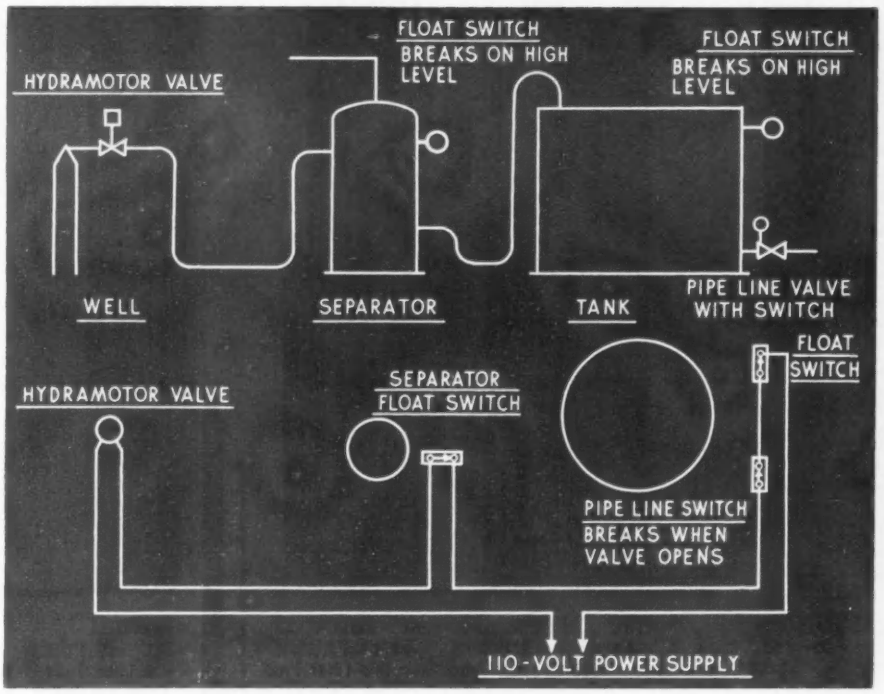
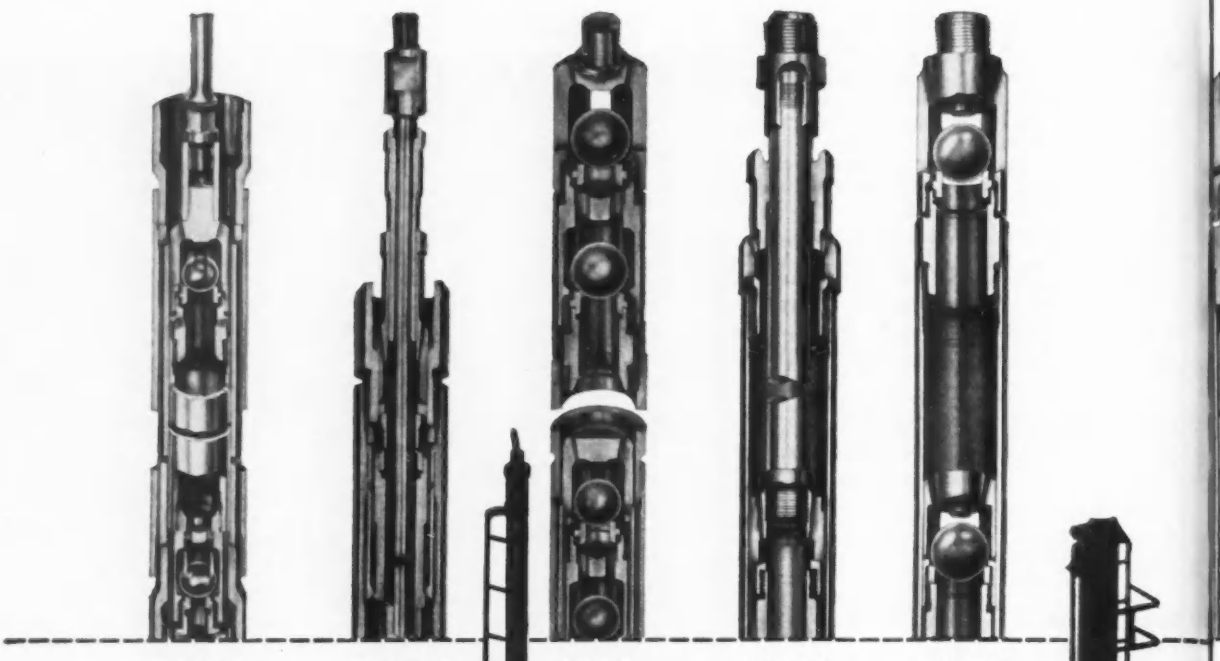


Fig. 1—Fundamentals of a supervisory system are contained in this one-well lease hookup.

How it works. The small electric motor driving the selector disc is energized only during the searching period. Once the contact brushes corresponding to an empty tank pass over the copper contact strip the supply voltage to the driving motor is shot off.

When a tank is filling, the fill line motor valve is energized and it remains open. The contact brushes corresponding to this tank being filled complete an electrical circuit to a relay switch that completes the circuit to the fill line motor valve. This same relay switch breaks the circuit which supplies current to the motor which drives the selector disc, and the disc remains stopped during this filling operation.

When the fluid level in the stock



DEEPWELL PLUNGER PUMPS Tubing Liner Type

DEEPWELL PLUNGER PUMPS Rod Liner Type Stationary Barrel

DEEPWELL PLUNGER PUMPS Rod Liner Type Traveling Barrel

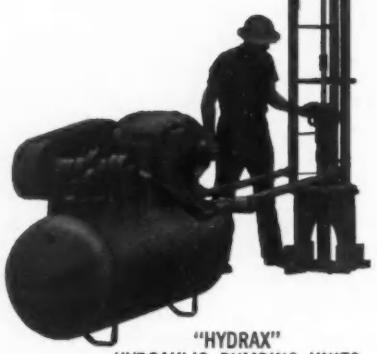
SURE-SEAL Rod Type Stationary Barrel

SURE-SEAL Traveling Barrel

LOOK TO

SUCKER ROD COUPLINGS

SEATS AND BALLS Ribbed Flat



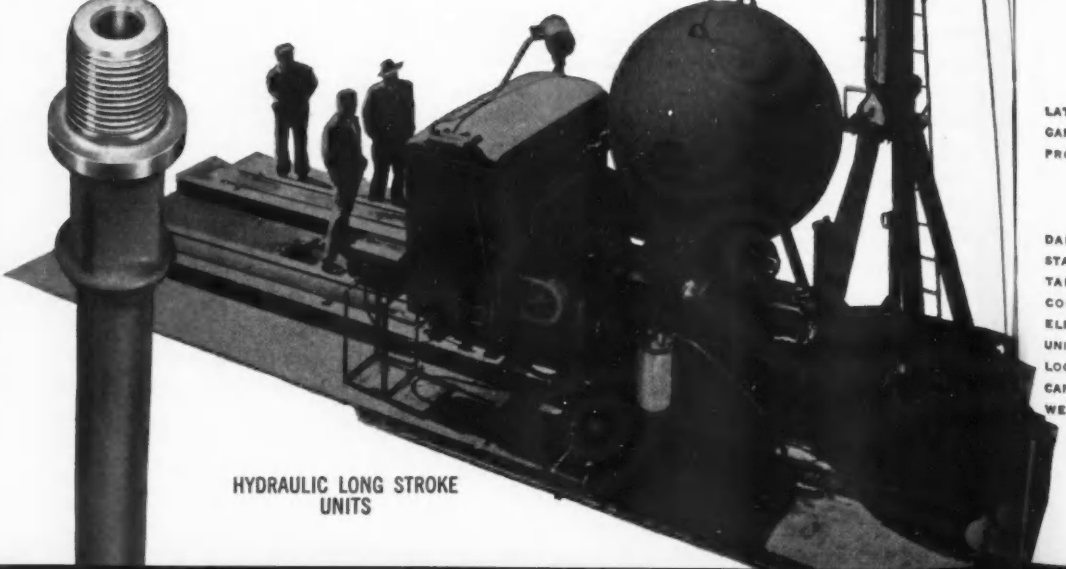
"HYDRAX" HYDRAULIC PUMPING UNITS 6′ and 10′ models

LINERS Regular Cast Iron Duax Hardened Cast Iron

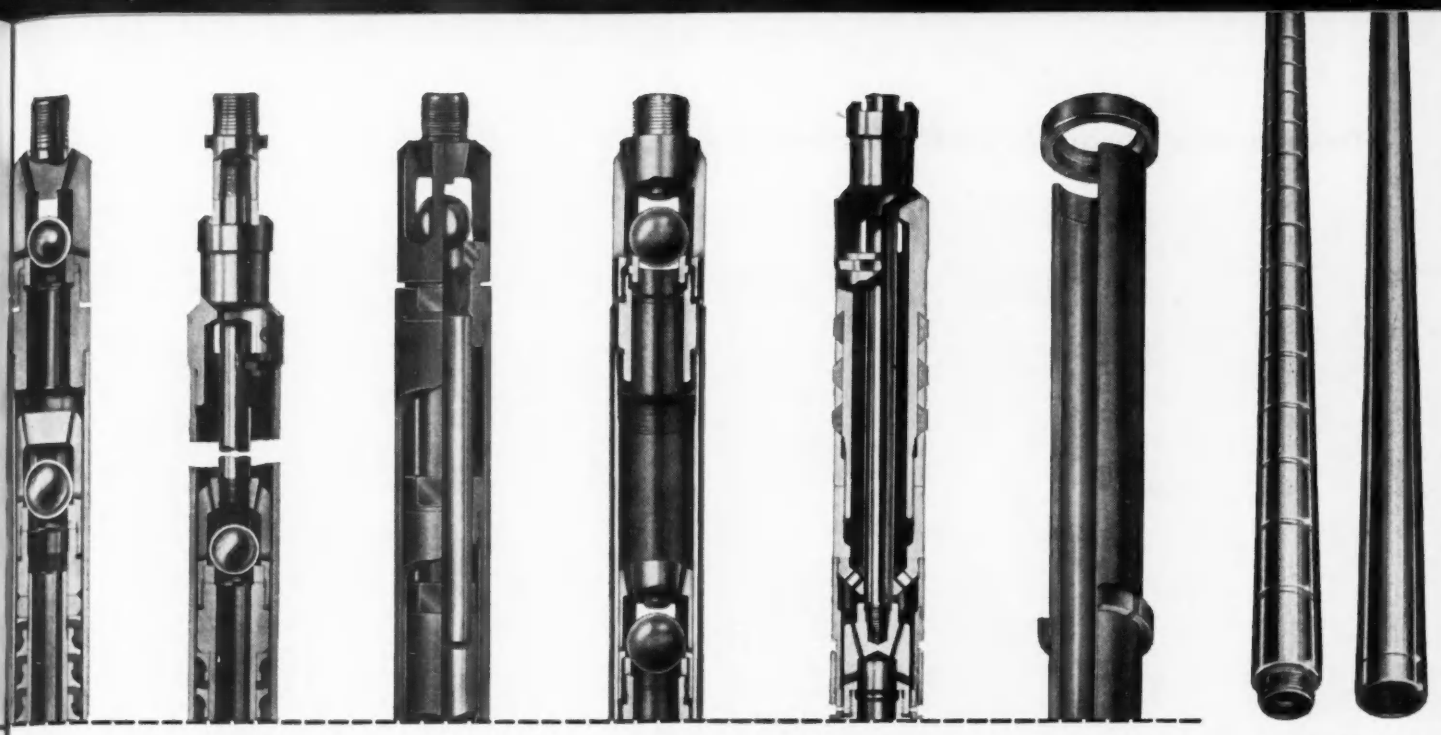
POLISHED RODS

SUCKER RODS

"HOL-O-ROD" HOLLOW SUCKER RODS



HYDRAULIC LONG STROKE UNITS



KUP-PAK PUMPS Traveling Type

KUP-PAK PUMPS Stationary Type

TRIAX PUMPS Traveling Barrel

DOUBLE DISPLACEMENT PUMPS

TWO ZONE Pumps

FULL LINER Pumps

PLUNGERS Grooved Plain

AXELSON

for the finest in petroleum pumping equipment

Over 62 years of Oil Country experience lie behind each Axelson product. Each has been developed to answer a definite need and each is a high quality, technically correct piece of pumping equipment. In the complete Axelson line there is a right combination for every well condition.

URE-HOLD" VALVE PULLER

STANDARD STUFFING BOX

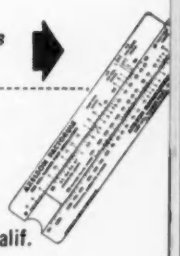
AXELSON MANUFACTURING COMPANY DIVISION
PRESSED STEEL CAR COMPANY, INC.
LOS ANGELES 58, NEW YORK 7, ST. LOUIS 14, TULSA 1

LATHES: ENGINE • TOOL ROOM • HOLLOW SPINDLE GAP BED • AIRCRAFT COMPONENTS • IRON FOUNDRY PRODUCTS • PETROLEUM PUMPING EQUIPMENT

DAIRY & FARM EQUIPMENT • WASTE CONTAINERS STAINLESS STEEL COOKWARE • CAR ACCESSORIES TANKS • AGITATORS • SMOKE STACKS • DUST COLLECTORS • COAL & ASH HOPPERS • FITTINGS ELECTRICAL ACCESSORIES • ORDNANCE MATERIEL UNISHELTER RELOCATABLE HOMES • EXPORT ONLY: LOCOMOTIVES • TRACKWORK • CARS (MINE, ORE, CANE, INSPECTION) • UNISTRUT METAL FRAMING WEED BURNERS • BRICK & TILE MACHINERY CANE LOADERS

Distributors in Oil Fields Throughout the World

We will gladly send you on request an Axelson Factorule which calculates production, loads and other factors in pumping wells.



- Sucker Rods ○
- Long Stroke Pumping Unit ○
- Seats and Balls ○
- Liners ○
- Plungers ○
- Hydraulic Pumping Units 6′ and 10′ Models ○
- Deepwell Plunger Pumps ○
- "Hol-O-Rod" Hollow Sucker Rods ○
- Factorule ○

To get your free copy of the literature at the left, please check and fill out coupon.

AXELSON MANUFACTURING COMPANY
P.O. Box 58335, Vernon Sta., Los Angeles 58, Calif.

NAME _____ TITLE _____

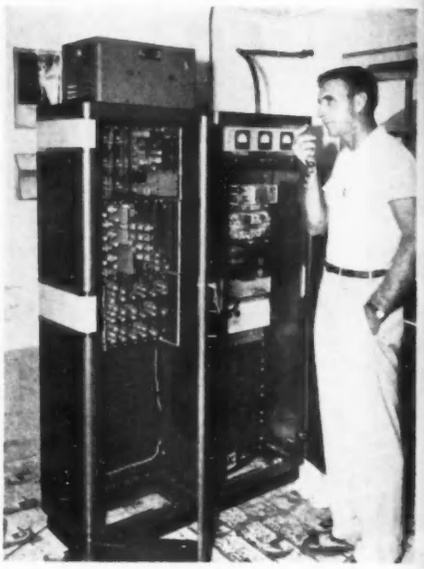
COMPANY _____

ADDRESS _____

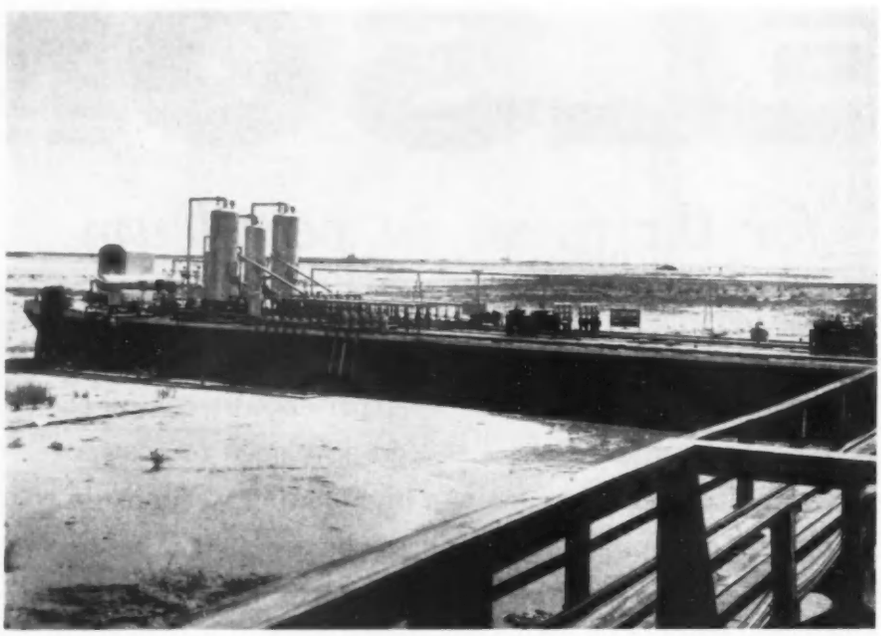
CITY _____ ZONE ____ STATE _____

Take a tour through Gulf's Timbalier Bay field installations . . .

1 Supervisory control console provides Eddie Hannahan, field engineer, complete control over the company's State Lease 1772 some two miles away. All control and supervisory functions are indicated on this unit.



2 Multiplexing equipment, including voice communications, is located at central control station. A similar unit is placed in the field. Here Engineer Ellis Norwood talks with field personnel.



3 Production barge 712 serves as the experimental tank battery at Timbalier Bay for Gulf's new remote production control and supervision system.

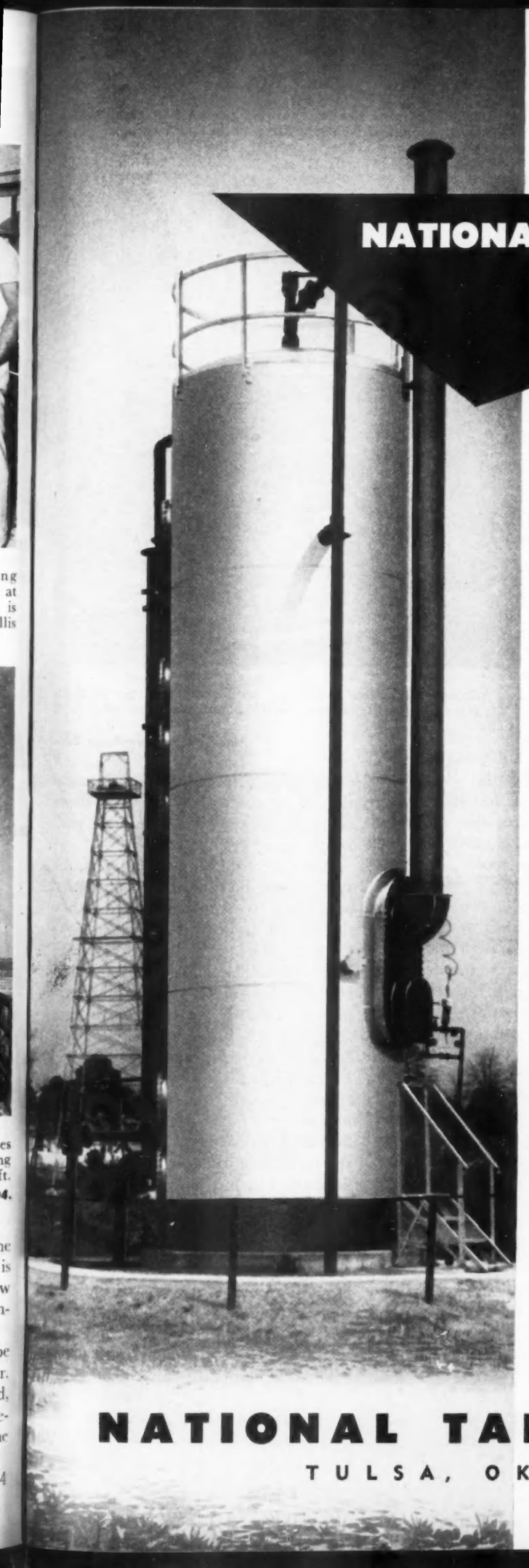
4 Field doghouse on pilings houses electronic gear and tank switching equipment. Note radio antenna at left.

More pictures on Page 204.

tank reaches a predetermined level, the float switch breaks the circuit which is supplying electrical current to the relay switch and it releases. In doing so, the circuit to the fill line motor valve is broken, and the valve closes automatically. In releasing, this relay switch closes the circuit to the electrical motor driving the selector disc and the disc begins to rotate.

As the copper contact strip passes the next set of contact brushes corresponding to the next empty stock tank, another relay switch is energized, which closes the circuit to the tank fill motor valve on that empty tank, and the fill line opens. When this relay switch is energized, it also opens the circuit which supplies current to the motor driving the selector disc, and the disc ceases to turn while the tank is filling. When this tank is filled, the process is repeated and flow diverted into the next empty or unfilled tank.

Tanks are emptied into the pipe line system by the pipe line switcher. When the pipe line valve is opened, the switch on that valve opens, thereby breaking the circuit to the fill line



NATIONAL ICP TREATER . . .

SAVES
$731.64 PER MONTH

Inter-Office Correspondence

To: [redacted] Date: April [redacted]

Subject: National ICP Treater
installed on our [redacted] Lease.

Dear Bud:

We thought you might be interested to know of the results obtained from the installation of the ICP Treater on our [redacted] Lease last September.

In figuring the amount of gas purchased for this lease, taking months comparable in weather conditions, six months before and six months after the installation, we find that in the preceding six months we bought gas in the amount of $1,298.99 and in the succeeding six months we purchased gas in the amount of $599.47 a total saving for six months of approximately $699.47 or $133.00 per month.

Before installing this Treater it was necessary that we clean ten tanks per month, losing approximately twenty barrels of oil each time. This would amount to 200 barrels per month or approximately $486.00 per month. This Treater has now been in service approximately eight months and we have not cleaned a single tank.

In addition to the gas and tank cleaning saving we also raised the gravity of the oil an average of 1°, which raised the price of the oil .02¢ per barrel. As this lease averaged 5,632 barrels of oil per month after installation of the Treater the amount gained on raising the gravity amounted to $112.64 per month.

We figure the total savings as follows:

$133.00 per month saving on gas.
$486.00 worth of oil saved each month.
$112.64 more per month for increased gravity.
$731.64 Total saving each month.

The first six months after installing this Treater we had saved $4,395.84. As the Treater cost $3,439.26, at the expiration of six months the Treater was paid for with $956.58 left over as profit.

Respectfully yours,

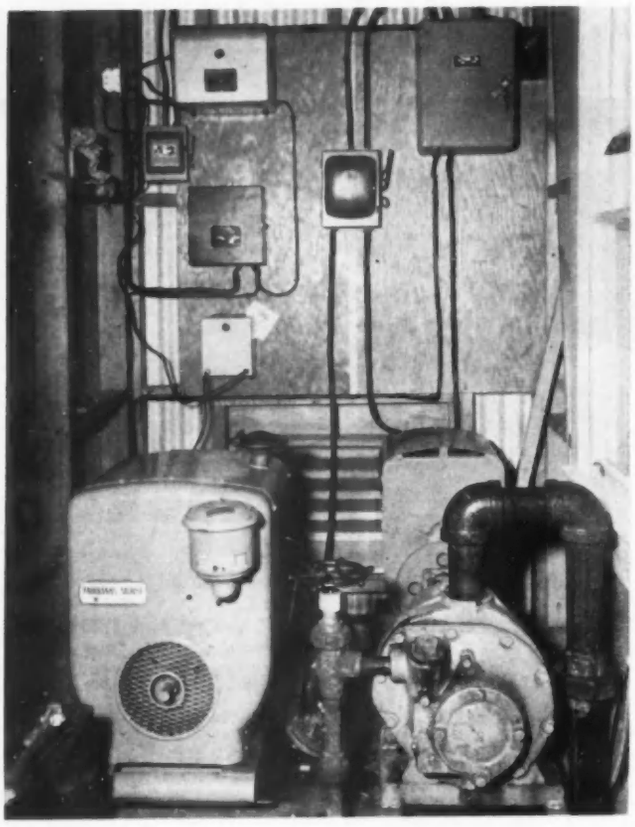
[redacted]

It's a National

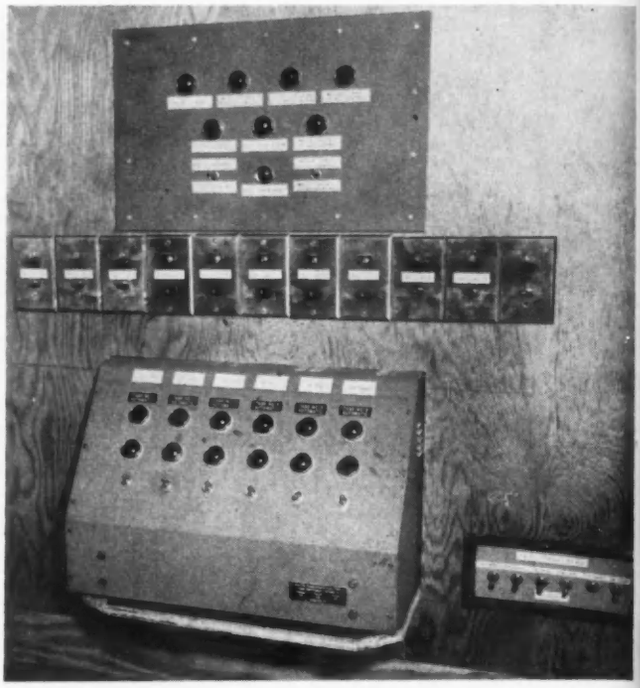
NATIONAL TANK COMPANY

TULSA, OKLAHOMA

Exclusive Export Representative
THE NATIONAL SUPPLY COMPANY, Export Div.
600 Fifth Avenue New York 20, N. Y.



5 Doghouse also houses gas turbine generator at right, standing by engine-driven generator at left and transfer panel on wall.



6 Control panel for automatic production controls in field. Housing for Robertson switcher extends from this wall panel.

More pictures on Page 206.

motor valve which automatically closes. It will not open until the pipe line valve is closed. So long as the pipe line valve is opened, the automatic tank switcher will pass that tank and go on to one which is not full.

Full tanks shut in wells. Without any tiein with the electrical circuit which energizes the motor valves on each flow line, it is easily understood that in the event that all tanks are filled that the selector disc would continue to rotate in a vain search for an empty tank. To meet this requirement, the Robertson Electrical Switcher is connected to the well flow line control circuit. In parallel with the electric motor driving the selector disc is an amperite time delay tube. So long as current is passing through the driving motor, current is also supplied the filaments of this amperite time delay tube.

The two open contact points of the amperite tube are in a circuit connected across the 110-volt alternating current primary supply voltage. The remainder of this circuit is tied into the coil of a relay switch which supplies current to the flow line motor valves of the individual wells.

In the event that all tanks are full, the selector disc of the Robertson switcher will continue to rotate as described above. Since the amperite time delay tube is in parallel with the selector disc driving motor, elements in the tube are heated. After the selector disc has made two full revolutions, or during the two minutes that current flows through the heating elements in the amperite time delay tube, the temperature inside the tube reaches a point to expand the contacts of the open-close elements in the tube.

These contacts when closed, complete the circuit to the relay coil which, when energized, causes the switch to open, thereby breaking the supply voltage to the individual flow line motor valves. When this voltage is cut off, the valves automatically close, and wells producing into the tank battery are closed in. Breaking this circuit also shuts off current to the driving motor on the selector disc, and the entire system becomes inoperative with all wells shut down.

After the pipe line switcher gauges the tanks, he opens the pipe line valve to empty a tank. When he opens the pipe line valve, contacts on the valve switch open, and the circuit is broken. This open circuit exerts the same control as does the float switch in the tank, since both are connected in series.

After a tank has been emptied, the system may be placed into operation again by a manual reset switch. When this switch is pressed, current passes through the coil of the electrical latch-in, mechanical hold, electrical release relay switch. This switch supplies current to the flow line motor valves which open when energized. Since the contacts of this switch hold in mechanically, the switch remains closed when the reset button is released.

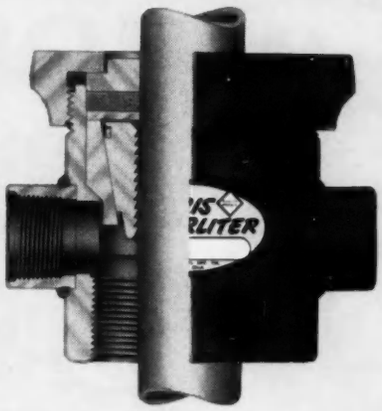
Separator controls. As described in the fundamental control system, high fluid level in any one of the separators at the tank battery will cause the wells to be shut in. As explained, this is accomplished by breaking the circuit which supplies current to each flow line motor valve, causing the valve to close. In the modified system, the float switches in each separator are normally closed when fluid level is below the danger point. So long as these float switches remain closed, the circuit to the coil of a double pole single throw magnetic switch is en-

IT'S NEW AT NORRIS!

TO REDUCE YOUR LOW-PRESSURE WELL COMPLETION COSTS

THE TYPE WCN TUBING HEAD

1,000 Lb. C.W.P.



The WCN Tubing Head is basically a Hinderliter design — with all the adaptable features of the higher rated heads — at a price to cut your completion costs on wells within its recommended pressure rating.

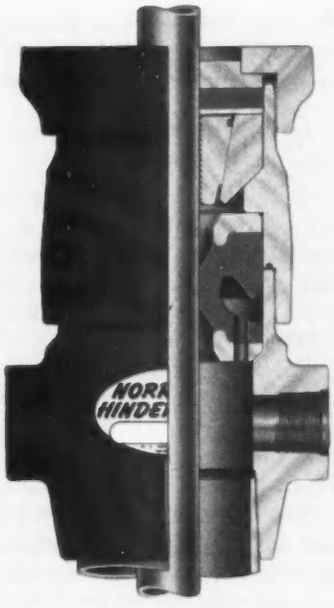
NORRIS HINDERLITER — QUALITY PRODUCTS — Top Quality WELL HEAD EQUIPMENT — W. C. NORRIS MFR. INC. TULSA, OKLA.

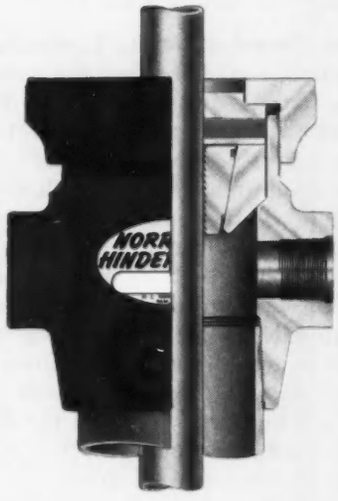
DEPENDABLE CONSTRUCTION — FULL OPENING — it is adaptable to acidizing, repressuring, water flooding — various completion and production methods.

The CAP FEATURE of the WCN assures positive holddown of the packing element when tubing is suspended, and provides a tubing spider base for running and workover jobs.

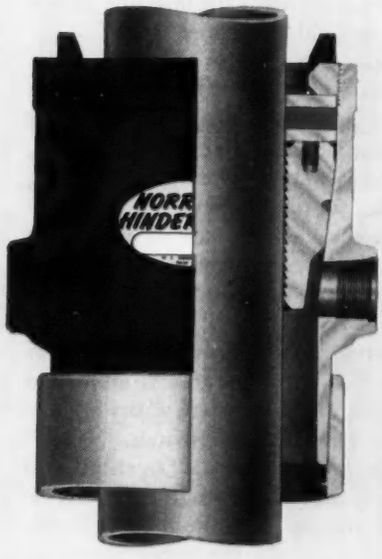
For ECONOMY—FLEXIBILITY—SAFETY—SPECIFY WCN.

All Tubing and Casing Heads in the Norris Hinderliter line combine functional design with expert machining, accurate gaging, and thorough testing to insure safe performance.





HW Four-in-ONE AND HW Two-in-One TUBING HEADS
4,000# Test Pressure — 2,000# Cold Working Pressure



YLS Casing Head
2,000# Test

Write for Well Head Equipment Bulletin for complete information.

W.C. NORRIS MANUFACTURER, INC.

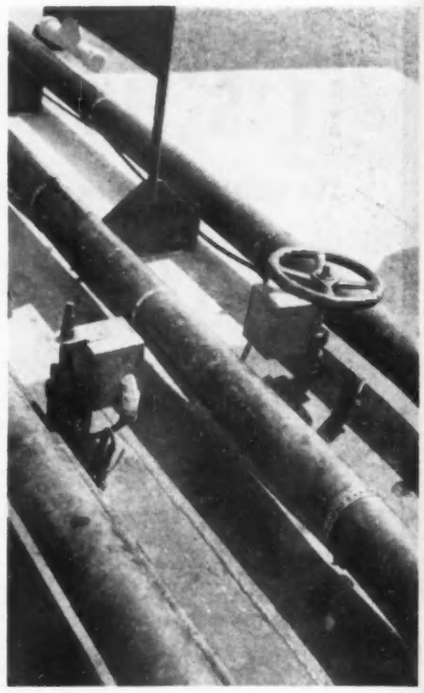
TULSA, OKLAHOMA

WEST COAST DISTRIBUTOR:
REPUBLIC SUPPLY COMPANY OF CALIFORNIA,
Los Angeles

Since NORRIS 1882

BRANCHES:
GREAT BEND, KANSAS; HOUSTON, KILGORE, ODESSA, TEXAS; SALEM, ILLINOIS; CASPER, WYOMING
EXPORT: 30 ROCKEFELLER PLAZA, NEW YORK CITY

7 Flow line motor valves located on the production barge. These valves are electrically controlled and remain open so long as they are energized. First five valves are plug valves operated by an electric motor through a gear train. Those in background are electro-hydraulic valves.



8 Switches mounted on pipe line valve stems. When the valve is open, the switch is open; when closed; the switch also closes.

More pictures on Page 210.

ergized. This switch, when closed, supplies current to the flow line motor valves to hold them open.

Should the level in any one of the separators in the system reach the danger point, the float switch breaks this magnetic switch relay circuit, thereby releasing the switch. In doing so, the supply current to the flow line motor valves is cut off and these valves close to shut the wells in.

To place the automatic controls back into operation and open the flow line motor valves, it is necessary to correct the separator trouble and reset the control system. This is done by the manual reset switch.

The float switch is essentially a mercury bulb type single pole double throw switch. High fluid level in the separator breaks the relay circuit to the switch supplying current to the flow line motor valves. When this relay circuit is broken, another circuit is completed which causes the separator high fluid level indicator light to come on.

A glance at the control panel will tell the operator whether or not high fluid level in the separator has caused the wells to be shut in. Lights for individual tanks also inform the operator the status of every tank. A green light indicates an empty tank. A red light indicates a full tank. When both red and green lights are glowing, the tank is being filled.

Valve closed at well. To simplify the installation of the flow line motor valves and to drastically reduce the cost of such a system, all flow line motor valves are located at the tank battery upstream of the flowline manifold. To keep full well pressure off the flow line from the well to the tank battery, a high-low pressure shut-off valve was used.

This valve, which is actually a regulator equipped with a pressure-controlled pilot valve on the control gas line, will be closed in should the flow line pressure increase a predetermined amount above normal flowing pressure. It will also close should the flow line pressure drop a predetermined amount.

Time delay feature. After all wells had been shut in for any reason, obviously it would be unwise to open them all up simultaneously. This is precisely what would happen under the automatic control system so far described. However, since it would be unsafe to permit the surge from every well to reach the first separator at one time, time delay mechanisms have been added to the electrical circuits to each individual flow line motor valve.

All flow line motor valves and all time delay switches are in parallel with 110-volt a.c. across them. When the control system is back to normal and the reset button is pushed, the 110 volts are imposed on all time delay switches and flow line motor valves simultaneously.

Purpose of these time delay switches is to control the opening of each well so that no two wells begin flowing at the same time. The first well will begin flowing immediately.

The remaining time delay switches are set so that the contacts to the flow line motor valve are closed successively at predetermined intervals. At Timbalier Bay, wells come on at four-minute intervals, and since there are ten wells, the time elapsed from the first well until the last well begins flowing is 36 minutes, for the first well comes on immediately.

The only difference between the field test installation at Timbalier Bay and a conventional field tank battery hookup lies in the barge which serves as a tank battery at Timbalier Bay. It is divided into six oil storage

a good "FIRST TIME" CEMENT JOB

while protecting permeable, low-pressure zones below from cement contamination

HERE'S HOW THE TRIPLEX SHOE OPERATES

A A Baker M&F Cement Baffle Collar is installed a joint or two above the Triplex Shoe to stop the cementing plug so that cement tailings are retained *inside* the casing, or a Baker M&F Cement Flapper Valve Collar can be used where an additional float valve is desired.

B Baker Casing Centralizers are installed on, and above, the shoe joint to center the casing and provide a uniform annulus to receive the cement slurry.

C A Hold-Down Strap (secured by shear screws) retains the Baker Metal Petal Basket close against the Triplex Shoe while running-in the casing and conditioning the hole.

D Cementing Ports are covered by the Tripping Valve until cementing is commenced.

E A spring-loaded Flapper Valve permits passage of the cement slurry through the Triplex Shoe, but closes instantly to prevent any return flow of the slurry.

F After reaching the desired point in the hole, circulation is established through the ample central passageway. A Tripping Ball is now pumped (or allowed to gravitate) downhole to seat upon Tripping Valve and prevent circulation through the Shoe. Pressure of 400-500 psi is applied to the casing to shear the Tripping Valve Shear Screws and force the Tripping Valve downward to expose the cementing ports.

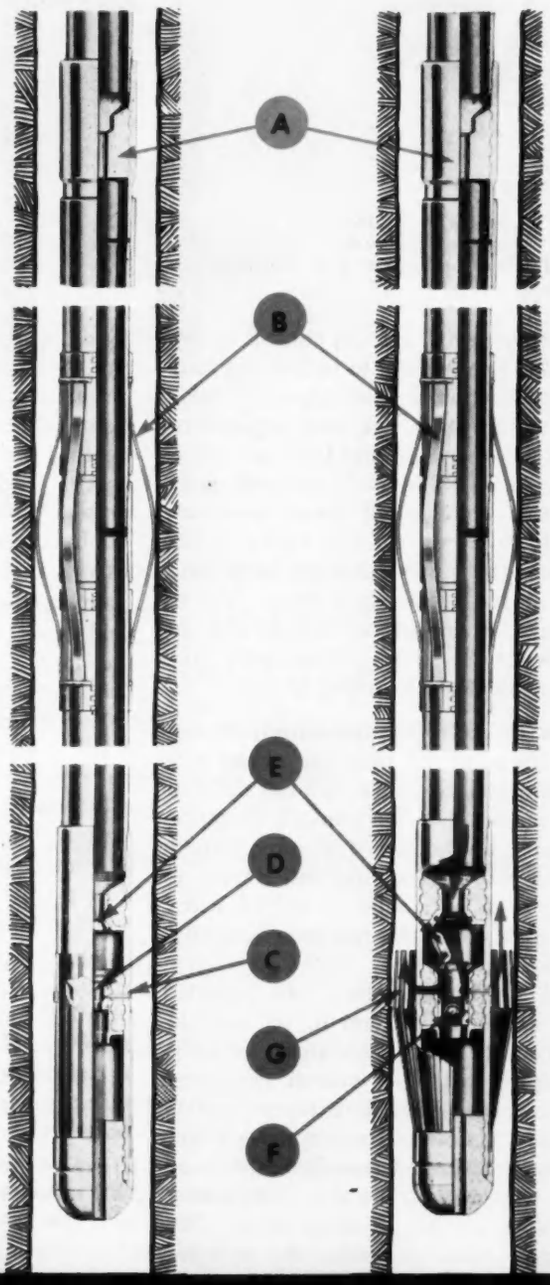
G Shearing these screws also releases the Basket Hold-Down Strap and allows the Metal Petal Basket to expand outwardly against the wall of the hole. The Basket has a wide range of expansion and forms a bridge in large-diameter or irregularly-shaped holes far beyond the range of a rubber packing element.

SUCCESSFUL CEMENTING FOLLOWS

The cementing operation is now carried out in the conventional manner with the cement slurry directed upward with the exclusive Baker "Whirling" action.

EASILY DRILLED OUT

Only readily drillable materials are used for all internal parts of the Baker Triplex Cementing Shoe; and two, one-half inch set screws hold the inner assembly stationary to facilitate drilling out.



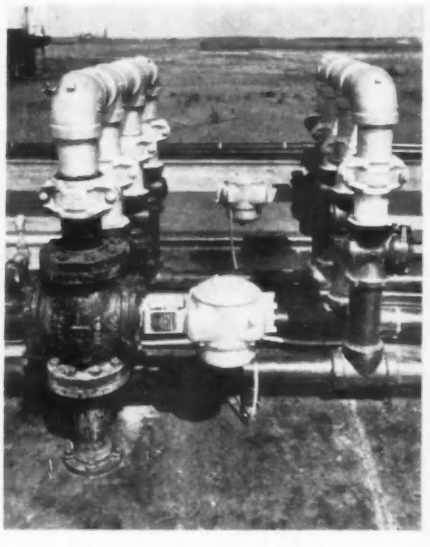
CONTACT any Baker representative or office for complete details as well as specific recommendations for using Baker Triplex Cementing Shoes.

BAKER OIL TOOLS, INC.
HOUSTON · LOS ANGELES · NEW YORK

BAKER *Triplex*
CEMENTING SHOE

9 Float switch mounted on side of separator. This watchdog shuts in the field when liquid level gets too high.

10 Float switches such as this are mounted in hatch cover of each of the six storage compartments of the barge.



11 Motor valves mounted in the tank fill lines permit automatic switching from a full tank to an empty one without manual operation.

compartments, and the control system had to be designed to include six tank float switches and six pipe line valve switches. There are four separators, one high-pressure and three low-pressure units. The field controls were located in a small frame structure built adjacent to the walkway between the sunken storage barge and the heater-treater unit some 150 feet away. Otherwise, the control and supervisory system is essentially the same as that described here.

Use of radio transmission. By understanding the principle of the system described above, it is not difficult to reason that the control operation can be accomplished at some remote station by connecting this station to the field system by means of wires. In some cases, this has been done successfully.

The Timbalier Bay field provided an excellent location to try out the versatility and dependability of radio coupled with the system described. This installation is a forerunner of future remote controls systems which employ radio transmission between an oil field and a central control station located up to 70 miles away. The use of radio precludes the stringing of connecting wires.

All supervising and control functions had to be transmitted along with voice communications from the field station to control headquarters miles away. At Timbalier Bay, the field is only about two or three miles distant from the field office. It is a marine type field, in that it is overlaid by water requiring boat transportation from office to the field. In bad weather such travel was impossible or unsafe at the most. Such a remote control system would be useful at Timbalier Bay as well as provide the proving grounds for such a system.

One radio station is located at the field office and a second station at the tank battery in the field. The control center at the field office consists of the electronic equipment called VHF radio and multiplexing gear, an emergency battery supply for the radio units, a battery charger, a standby engine-driven generator, and a transfer panel. Under normal conditions, the campsite is supplied electrical power from a utility line.

The remote station in the field is similarly equipped, that is, it consists of VHF radio and multiplexing gear, tank switching unit, control panels, a standby engine-driven generator, a transfer panel, a battery charger and batteries. In normal operations, electric power is furnished by a gas turbine generator. Separator gas drives the gas turbine. The standby unit supplies the electric power to operate the automatic control system and the radio unit during that time that all wells are shut in and no gas is produced.

A 72-hour battery powers a low-drain radio unit when the field is shut down completely during emergencies, such as hurricanes. During such times the standby generator may be started from the central control station by means of the battery-powered unit. Once the standby unit is operating, the lease may again be put back on production. Gas taken from the separator drives the gas turbine generator which takes over automatically, and shuts down the standby generator. This information is relayed back to the central control station.

The standby generator unit at the campsite serves as insurance against power shut downs caused by utility high lines being blown down or broken. The battery-powered equipment may be used should the standby generator fail.

Multiplexing unit. Duplex radio channels between 72 and 76 megacycles carry coded signals to and from the field. The central station at the campsite transmits on one frequency in this band which is received by the field station. In turn, the field station transmits on another frequency in this band which is received by the central control station.

A more detailed description of the function of the multiplexing equipment in conjunction with automatic production controls was presented in the June, 1954 issue of WORLD OIL, and for that reason will not be given here again except to summarize.

Intelligence transmitted to and

Continued on Page 219

COOPER MODEL "420"
for WORKOVER and SERVICING

Rated To 10,000*

SO COMPACT that it can be transported on a medium size truck. Only 38,600 lbs. including mast, unit and truck—as pictured above.

TORQMATIC DRIVE —Torque converter and full torque shifting transmission for fast, easy and safe operation.

AIR FRICTION CLUTCH in drum.

BIG BRAKES —42" diameter x 8" wide face. Brakes are dead end equalized with 1" thick A.P.I. brake blocks.

Triple strand 1¼ pitch roller chain drive to drum.

BIG 5¾" diameter SAE 4140 Steel drum shaft.

YOUR CHOICE of gas-gasoline or diesel engines up to 300 horsepower.

We invite you to compare this rig, point by point, with any other rig in its power class.

* Hydrotardes Brake Available

Over 40 models and sizes of servicing rigs, ranging from the smallest rated to 1500 Ft. of 2½" tubing, to the largest for any depth.

FRED E. Cooper, Inc.

P. O. BOX 1890 **TULSA, OKLA.**

Houston, Odessa, Los Angeles, Olney

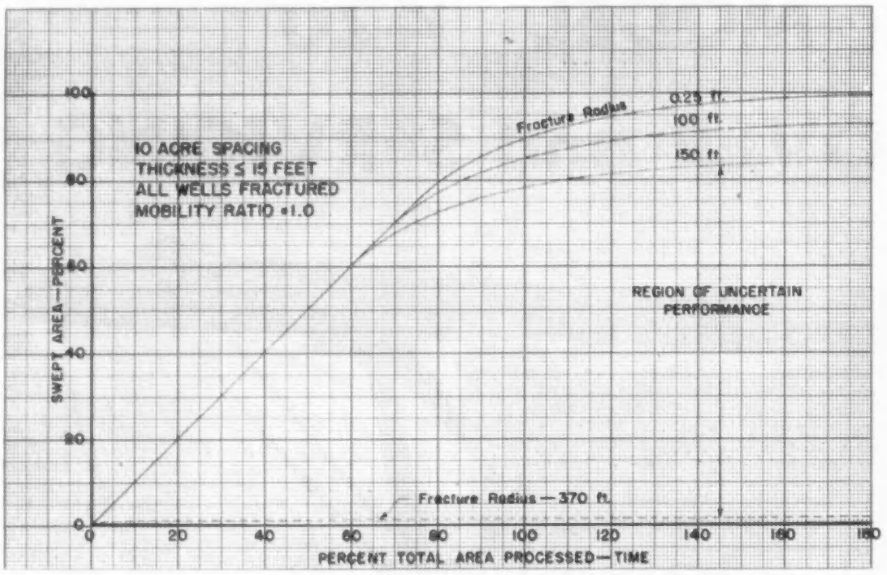


Fig. 1—Estimated performance of the staggered line-drive pattern in water-flooding and gas cycling horizontally-fractured thin reservoirs.

Water-flooding and gas cycling affected by . . .

Horizontal Fractures In Thin Reservoirs

Part 3: Estimated performance of the staggered line-drive pattern.

By DR. PAUL B. CRAWFORD, Texas Petroleum Research Committee, Texas A. & M. College, College Station, Texas

FEW QUANTITATIVE data are available to aid in estimating the effect circular horizontal fractures may have on water-flooding and gas cycling performance of reservoirs. Planned fracturing is so new that little field data are available at this time. Consequently, it appeared desirable that studies be made to estimate the effect circular horizontal fractures may have on flooding and cycling performance.

Horizontal fractures considered were those which originate at the well and extend radially out into the reservoir. They have a very high permeability compared with the matrix proper. In flooding or cycling, consideration should be given not only to the sweep efficiency at breakthrough, but to the swept area for extended periods of fluid injection after breakthrough occurs. It is known for certain unfractured conditions that considerable quantities of desired fluid may be recovered after breakthrough.

The problem. In initiating this study, potentiometric model studies were made of a horizontally fractured reservoir in which thin copper disks were soldered to the well or wells. The copper disk represented a circular horizontal fracture of high permeability compared to the conductivity of the electrolyte. This is believed to be similar to that which occurs in some reservoirs. Previous preliminary work has indicated that if the fracture permeability is from 300 to 1000 times greater than that of the matrix, results obtained will be substantially those which occur when the fracture permeability is considered to be infinite.

The thin copper sheets which represented the fracture were circular and constituted an isopotential in the model reservoir. Under these conditions it was found that the isopotentials from the periphery of one fracture to the opposite well or fracture were substantially the same shape as those which occurred when no fractures were present. Consequently, it seems that certain portions of the observations which are made on unfractured systems may be used for estimating the results when circular horizontal fractures exist in thin reservoirs.

A thin reservoir is defined as that in which the thickness of the pay divided by the well spacing is equal to or less than 0.022. The results which are presented here and have been presented heretofore may apply to thicker reservoirs, but it has not been demonstrated.

Muskat and Wyckoff[2] presented theoretical sweep efficiency calculations which apply to the staggered line drive pattern. Their work may be used to estimate the performance of reservoirs at a mobility ratio of one. Dyes, Caudle and Erickson[1] presented work on the effect of mobility ratio on the oil recovered after breakthrough for the five spot, line drive and staggered line drive patterns.

Certain portions of their work may be used to etsimate the performance of horizontally fractured reservoirs, provided the periphery of the horizontal fracture corresponds to an isopotential in the unfractured system. For short distances from the well, that is, up to 150 feet, the isopotentials are substantially circular. Consequently, the work may be used to estimate the performance of horizontally fractured thin reservoirs for fractures extending up to 150 feet in radius.

Staggered line drive. Figure 1 shows the calculated water-flooding and gas cycling performance of horizontally fractured thin reservoirs. The upper curve was obtained by cross plotting the data in Reference 1. The figure has been prepared for a ten-acre well spacing whose reservoir thickness is equal to or less than 15 feet.

It is assumed that all wells are fractured, and that the mobility ratio is one. From the figure it will be noted that the sweep efficiency, that is, the swept area at breakthrough is equal to 76, 68.2 and 60 percent for the case of no fractures, 100 and 150-foot fractures, respectively.

For the case in which no fractures

occur, it will be noted that when fluid corresponding to 100 percent of the total area has been injected that a swept area near 89 percent may be expected. When fluid corresponding to 140 percent of the area has been injected the swept area may be expected to be near 97 percent.

The swept area approaches 100 percent when fluid equivalent to 180 percent of the total area has been processed. The abscissa may also represent a time coordinate for fluid injection systems. For the case in which 100-foot fractures exist at each well, it will be noted that after breakthrough the performance is less efficient than the unfractured case.

When a fluid volume corresponding to 100 percent of the total area has been processed the swept area is expected to be near 85 percent. This is approximately 4 percent less than would have been expected had no fracture existed. When a fluid volume corresponding to 180 percent of the total area has been processed a swept area near 93 percent may be expected. Had no fracture occurred, the swept area would have been near 100 percent when the same quantity of fluid had been injected.

If fractures of 150-foot radius exist at all wells, a swept area of near 60 percent may be expected when breakthrough first occurs. The performance of the reservoir with 150-foot fractures is indicated to be less efficient than that for the case in which 100-foot fractures occur. When a fluid volume corresponding to 100 percent of the total area has been processed the swept area is expected to be near 78 percent. When the fluid volume corresponding to 180 percent of the total area has been processed a swept area near 84 percent may be expected. This should be compared with approximately 100 percent when no fractures occur.

The quantities of fluid will increase as the fracture radius increases. If it is desired to achieve an 80 percent swept area, it will be noted that the fluid processed for the case of no fractures, 100-foot fractures and 150-foot fractures will be 82, 86 and 112 percent of the total area, respectively. That is, it will require the injection of approximately 35 percent more fluid to achieve an 80 percent swept area if fractures of 150-foot radius exist at all wells than it would require if no fractures had occurred.

If it is desired to achieve a swept area near 84 percent, it will be noted that the injection of approximately twice the quantity of fluid will be required for the case in which 150-foot fractures occur than for the case in which no fractures occur. It will be noted on Figure 1 that the region between 150 and 370 feet is indicated to be a region of uncertain reservoir performance. The circular isopotentials which exist about the wells for the staggered line drive pattern are not indicated to exceed 150 feet for a ten-acre spacing. Consequently, the creation of fractures greater than 150 feet will result in a distortion of the normally existing isopotentials. In such case the swept areas may vary considerably and will depend upon the exact nature of the fracture.

If the fractures extend 370 feet from each well interconnections may occur, and the sweep efficiency will be reduced to near zero. The region of 150 to 370 feet carries some element of risk in fracturing, since a fracture of 250-foot radius may result in a sweep efficiency of only twenty to thirty percent. The results would depend upon the exact shape of the fracture, fluid mobility ratio, stratification, etc. The swept area might be estimated in a potentiometric model or similar analogue model.

Pattern conductivity. Creation of circular horizontal fractures in thin reservoirs result in a substantial increase in the conductivity of the pattern. For the staggered line drive with a ten-acre spacing, it is estimated that the creation of a fracture of 50-foot radius at each well will result in a three to four fold increase in the pattern conductivity. That is, if the reservoir is now taking one barrel of fluid per foot per day for a given pressure, it will take three to four barrels of fluid per day after fracturing. If it requires 30 months to achieve breakthrough without fracturing, it will require 8 to 10 months after fracturing to 50 feet.

If all wells in the staggered line drive pattern are fractured to a radius of 150 feet, the conductivity is expected to be six or seven times greater than that of the unfractured system. The above were calculated for an initial well radius of 0.25 feet.

It was indicated that the creation of circular horizontal fractures will require the injection of larger quantities of fluid to achieve the same swept areas. However, in view of the fact that the conductivity of the pattern will be increased by factors from three to seven it may readily be shown that the flooding or cycling program may process the additional required fluid and still complete the flooding or cycling operation in less time after fracturing than would be required before fracturing.

Discussions and conclusions. Sweep efficiencies at breakthrough for this pattern using a ten-acre spacing are indicated to be 76, 68.2 and 60 percent for the case of no fractures, 100 and 150-foot fractures, respectively. If no fractures occur, the swept area may approach 100 percent when a fluid volume corresponding to 180 percent of the total area has been injected. If fractures of 100 or 150 feet occur, ultimate swept areas are expected to be near 93 and 84 percent, respectively.

Creation of circular horizontal fractures at a well are indicated to result in requiring additional quantities of fluid to achieve the desired swept areas after breakthrough. A review of the conductivities of these patterns indicates that the increase in conductivity will be substantially greater than the increase in fluid required. Consequently, it is to be expected that water flooding or gas cycling programs may be completed in fractured reservoirs in perhaps one-third the time required without fracturing. The actual time, of course, will depend upon the type of pattern, length of fracture at each well, mobility of the fluids, plant capacities and other considerations.

Creation of fractures greater than 150 feet for the case of the ten-acre spacing is indicated to be a region of uncertain performance. If fracture radii of 370 feet exist at all wells, the swept area is expected to be near zero. For these long fractures, interconnections may occur, and consequently, the injected fluid will channel from the input to the output well. It is suggested that studies be made of the fractures prior to initiating the water flooding or gas cycling program.

REFERENCES

[1] Dyes, A. D., Caudle, B. H., and Erickson, R. A., "Oil Production After Breakthrough—As Influenced by Mobility Ratio," Presented Fall Meeting AIME, Dallas, Oct., 1953, Paper No. 309-6.

[2] Muskat, M., and Wyckoff, R. D., "A Theoretical Analysis of Water Flooding Networks," AIME Trans., Vol. 107, P. 62 (1934).

TO BE CONTINUED

New Liquid Level Gauge Available to Industry

• U. S. Bureau of Mines engineers have developed an instrument that is accurate in foaming wells.

• It records liquid level movement continuously at the surface.

• Here's a description of the design and operation of the new instrument.

A NEW LIQUID-LEVEL gauge based on the buoyancy principle and utilizing electric circuits to transmit and record measurements of static or moving liquid levels has been developed by Bureau of Mines engineers and is now available to the industry. Depth in wells, tanks and other vessels may be determined to within plus or minus one-half inch, even though foaming exists on the liquid surface.

The instrument is 1¾ inches in diameter and approximately six feet in length and may be operated through two-inch tubing. The gauge consists essentially of a float that moves upward with respect to the rest of the assembly, causing a change in the flow of current through recording circuits when the liquid level has been contacted.

Figure 1 is a scale drawing showing a section through the liquid-level gauge and a diagram of the required auxiliary equipment. The instrument is lowered into the well on an insulated, armored cable from a reel equipped with a depth indicator. In the electric circuit at the surface are: a suitable source of current such as flash-light dry-cell batteries, a milliammeter to indicate the amount of current flowing, and a variable resistor by which the maximum flow of current is restricted to the capacity of the milliammeter. The fixed resistors are selected and arranged in the circuit to reduce the flow of current by equal increments as the sliding contact moves from one contact sleeve to the next.

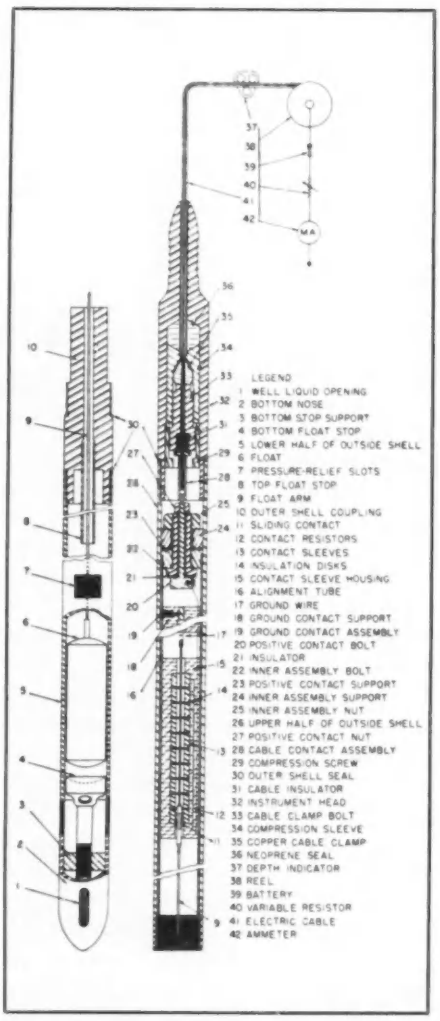


Fig. 1—Schematic cross-section of new liquid level gauge identifying component parts.

The gauge is fastened to the cable by a pressure-sealed instrument head designed to prevent well fluids from entering the instrument and to hold the cable securely. The instrument is fastened to the cable by pressure applied through a cable clamp bolt. By clamping only half the strands of the cable armor, the weakest point in the cable occurs within the instrument. Thus, if the instrument should become stuck in a well, the cable could be broken at the clamp and removed from the well. In this way a "clean" fishing head would be provided to facilitate retrieving the instrument.

How it works. For proper functioning, friction between the moving parts of the liquid-level gauge must be kept to a minimum so that the float may move freely with changes in the liquid level. This is accomplished to a large extent by avoiding the use of a packing gland between the float and the electric system.

As the instrument is hermetically sealed above the pressure-relief slots, air or gas in the upper part of the instrument must be compressed before liquid will reach the electric circuits. By providing a proper distance between the slots and the electric system through an extension of the capillary tube and the outside shell it is possible to allow for several feet of submergence before the liquid level in the instrument will reach the electric system.

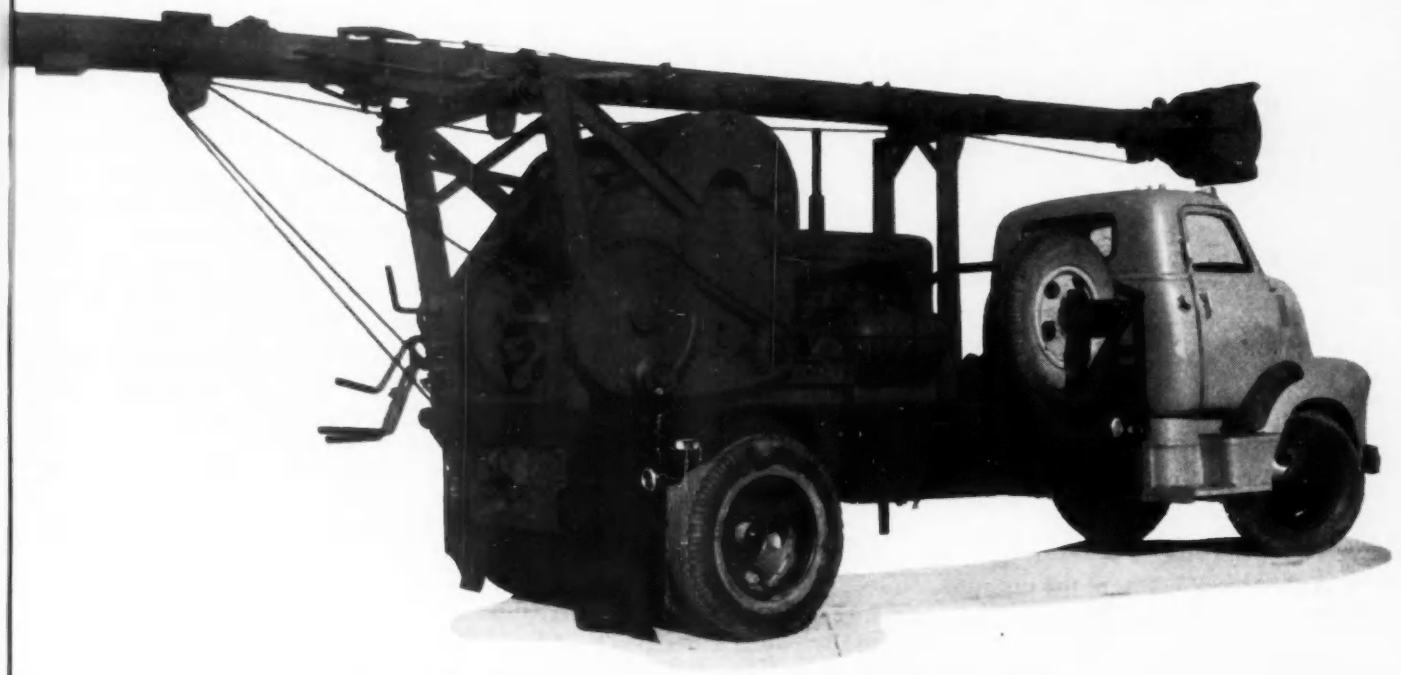
If the void space in the instrument between the slots and the electric system is equal to, or exceeds, the void space between the bottom of the electric system and the top of the instrument, about 30 feet of submergence will be required to force liquid into the electric system if the well pressure above the liquid is atmospheric. Where the pressure above the liquid is greater than atmospheric, the permissible submergence will be increased. If the pressure just above the liquid level is 50 pounds per square inch gauge, the permissible submergence will be approximately 150 feet in fresh water. This figure will be somewhat less for brine and greater for oil. The permissible submergence is a function of the density

FRED E. COOPER INC. TULSA
HOUSTON · ODESSA · LOS ANGELES
DRAW WORKS
SPUDDERS
WINCHES
POWER UNITS

The LEADER by far—

COOPER—ALLIS-CHALMERS

Model "W" Servicing Winches



For years used by more producers and contractors than any other winch in its class.

NOW—better than ever
23% MORE POWER
SIMPLE TO OPERATE—Vacuum Powered Controls

EASY TO MAINTAIN—Drum and drum clutches mounted on pre-lubricated sealed ball bearings that require no attention.

Chains run in line at all times whether clutches are engaged or disengaged.

RUGGED AND COMPACT—A light truck will transport with ease.

Rated at 1500′ to 3000′

The most complete line of well servicing equipment. There is a proper size and type for any field condition and depth well.

There's a model "W" operating near you—ask the owner what he thinks of its performance and economy.

FRED E. Cooper, Inc.

P. O. Box 1890 TULSA, OKLA.
Houston, Odessa, Los Angeles, Olney

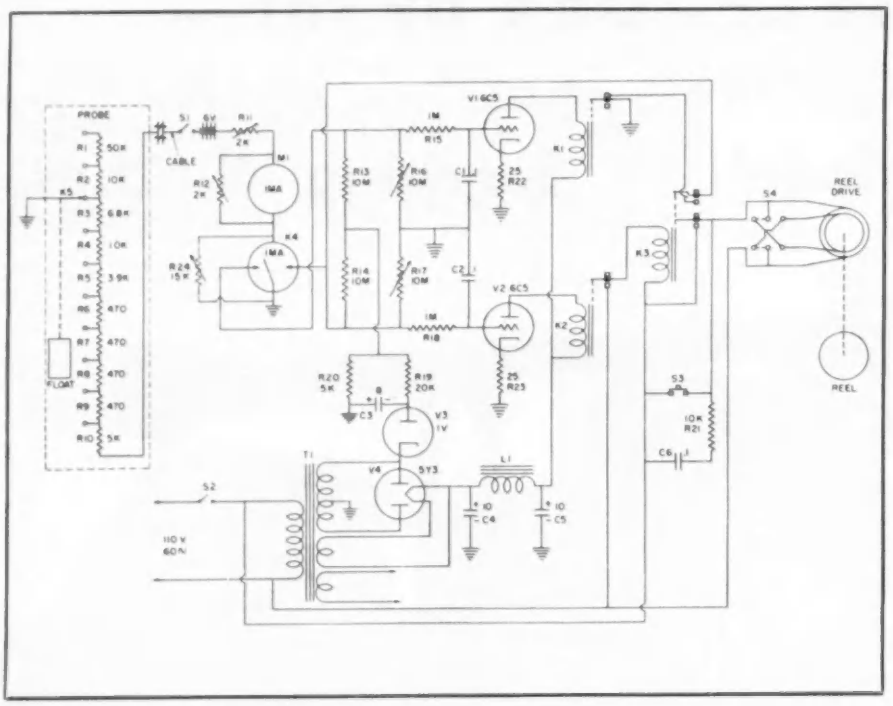


Fig. 2—Electrical circuit of gauge, showing downhole probe at left, cable and surface equipment at right.

of the liquid as well as of the pressure at the surface of the liquid.

Another novel feature that contributes materially to the successful operation of the instrument is the use of a float that is open to the well pressure through a capillary tube extending 24 inches or more above the top of the float. The capillary tube is thin walled so that it does not add materially to the weight of the float. Placing the opening to the float at the level of the electric system provides the same protection against filling the float with the well liquid as that provided for the protection of the electric system against the entry of liquids.

The instrument may be controlled manually to locate a static liquid level or to follow a moving liquid level in a well, tank or other vessel. A moving liquid level may be followed by lowering the instrument at such a rate that the ammeter needle is maintained in the same position at all times. An alternate method is to lower the instrument until the sliding contact is near the middle of the series of sleeves as indicated by the ammeter. From a knowledge of the thickness of the sleeves, the movement of the liquid level may be interpreted from the movement of the ammeter needle. If the latter procedure is followed, the instrument will be raised or lowered as much as is necessary to bring the sliding contact to the center of the contact sleeves each time it has reached the limit of movement. The rate of movement of the liquid level may be determined.

The electrical circuit of the liquid-level gauge is shown in Figure 2. The gauge may be positioned automatically to permit its use in following a descending liquid level without constant attention. This enables the operator to record running measurements from which precise calculations of the rate of change of liquid level may be made. In its present form, the instrument will follow only a falling liquid level. With a simple circuit modification, the pilot could be made to follow either a falling or a rising level as selected by the operator. **Note:** This instrument patented by David B. Taliaferro, Clifford F. McClung and Fritz G. Mueller, all of the Bureau of Mines, Bartlesville, Okla., and the patent assigned to the U. S. government. License to build the instrument, and complete working drawings may be obtained from the Secretary of the Department of Interior, Washington 25, D. C.

ACKNOWLEDGMENT

This summary excerpted from U. S. Bureau of Mines Report of Investigations 5060.

—**The End**

from each station is in the form of audio tones. For each control and supervisory function, a combination of two tones is used. This combination is different from any other combination used. A control function is defined as one which is acting upon something, such as opening or closing the flow line motor valves, starting and stopping the standby generator, etc. A supervisory function refers to the continuous reporting of the status of the field control system. For example, a green light indicates that a tank is empty; a red light shows that it is filled; and a green and red light implies that the tank is being filled.

These tones are generated by electromagnetic driven tuning forks; and decoded at the receiving station by resonant reed relays which are also electro-mechanical devices. When a control function is transmitted to the field station, such as to close the wells in, two tone pulses are generated. When this particular combination of tones is received, they are relayed back to the central control station. When these two tones are received back, a white light glows on the control panel to indicate to the operator that the proper instruction was received.

When the control function has been acted upon, such as closing the flow line valves, a third tone is relayed back to the central control station. Receipt of this tone causes a red light to glow, indicating that the valves are closed.

The master station control console is about the size of an electric calculator. It contains supervisory indicating lights and control buttons. Individual point escutcheons are provided to indicate tank conditions, whether filling, full or empty. On and off indications are provided for the gas turbine generator, the breaker controlling power to the flow line motor valves, separator high fluid level alarm, and the full storage alarm (when all tanks are filled).

Over-all operation. Commencing with the field completely shut in, the supervisory control system is not energized. Only the battery-powered radio receiver with a special tone-

Continued from Page 210

operated start function is on stand-by condition. When the operator at the central station pushes the start button on this control panel, the gasoline engine-driven generator is automatically started, which is indicated on the panel.

After the equipment warms up, a complete check of all functions is made which is indicated on the supervisory control console located at the central control station. The control panel is reset and the operator pushes the "wells open" button. When this instruction has been executed, a green light glows to indicate that fact.

When separator pressure reaches a predetermined point, the gas turbine starts operating, and the standby generator is stopped automatically. A red light on the central control console indicates that the standby generator has been shut off.

Once the system has been placed in operation, the automatic production controls take over. Tanks are automatically switched, with proper indications transmitted to the central control station when a check is desired.

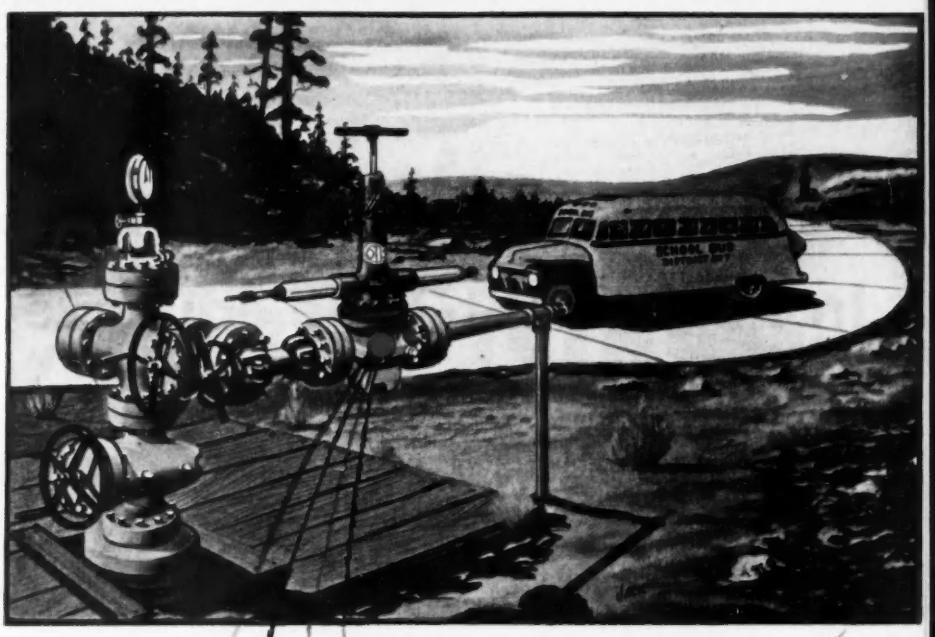
Should any of the supervisory functions close-in the producing wells, such as high fluid level in the separators, or when all tanks are full, such condition is reported back to the central control station.

New horizons. In operation for several months, Gulf's Timbalier Bay remote automatic production controls has proven that such a system is feasible and practical. Undoubtedly, there will be some modification, simplification and additions made. Flexibility of the present system makes it possible to include up to 90 control and supervisory functions, and as many as ten remote stations can be handled from one central control station. And, do it from 70 miles away! To companies looking to the day when the continental shelf of the Gulf will be spotted with productive fields, remote controls such as described here will be a boon to their operation.

ACKNOWLEDGMENT

For the cooperation given by Gulf Oil Corporation in securing data and for permission to publish this paper, for the constructive aid given by C. R. Bayless under whose direction this control systtem was developed, and for the help provided by J. W. Daughtrey who worked out much of the details of this system, the author is grateful.

—The End



The Best Friend Your Well Has Otis Safety Valves

OTIS PRESSURE CONTROL, INC.

Branches Throughout the Oil Country

PRESSURE CONTROL OTIS SERVICE - EQUIPMENT

Bentonite Cements Proving Successful In Permanent-Type Squeeze Operations

Relatively small slurry volumes needed, low filtration loss, low density, controlled setting time are some outstanding features of this new cement. Field experience and lab data are given.

By B. E. MORGAN and G. K. DUMBAULD, Humble Oil & Refining Company, Houston

AN IMPORTANT operation in the permanent-type well completion technique is the squeeze-cementing of wells to seal off undesirable production of water or gas. The use of a relatively low-water-loss cement slurry is necessary in the operation. In addition, it is desirable to have a low-density slurry.

Slurries prepared from conventional neat cements are unsatisfactory because they have extremely poor filtration characteristics and high densities. Slurries prepared from cements containing bentonite and calcium lignosulfonate are satisfactory because they have improved filtration characteristics and lower densities.

Conventional neat cement slurries lose water by filtration at the rate of about 600 to 800 cubic centimeters in 30 minutes when tested in the usual API filtration tester, whereas cements containing bentonite and calcium lignosulfonate have 30-minute API filtration rates of about 50 to 100 cc.

Conventional neat cement slurries weigh about 15 to 16½ pounds per gallon, whereas cements containing bentonite weigh about 11½ to 13½ pounds per gallon. Laboratory data which are presented in this report show that cements containing bentonite and calcium lignosulfonate possess satisfactory thickening time and strength properties for squeeze cementing in accord with the permanent-type well completion technique. Field experience on approximately 210 jobs, which is reviewed briefly, demonstrate the utility of cements containing bentonite and calcium lignosulfonate for this application.

A primary feature of the permanent-type well completion method is the repair of wells by squeeze-cementing existing perforations and reperforating at the same depth or at a higher or a lower interval without removing the tubing from the well. Early in the development of the technique, laboratory and field-size experiments showed that conventional neat cement slurries were unsatisfactory for use in this procedure. The extremely high filtration rate of neat cement slurries allowed the deposition of a compact mass of cement solids inside the casing and made it impossible to remove excess cement by reverse-circulation.

This difficulty was not encountered in tests when the filtration rate was reduced by the addition of bentonite and calcium lignosulfonate to the cement. Furthermore, the lower density of bentonitic cement slurries was advantageous because the pressure required to reverse out excess slurry was less than with heavier neat slurries. The necessity of a cement slurry with relatively low water-loss properties and the desirability of a low-density slurry have been emphasized in two previous publications.[1,2]

Considerable laboratory data and field experience with cements containing 12 to 14 percent bentonite and 0.25 to 0.75 percent calcium lignosulfonate have been obtained in connection with the primary cementing of casing.[3,4,5] Although the conditions for primary cementing are less severe than for squeeze cementing, it was possible to use the data and experience on primary cementing, with certain precautions, to get the permanent-type squeeze work started.

In the meantime, laboratory tests at temperatures and pressures more nearly simulating those encountered in permanent-type squeeze operations were made on cements with 12 percent bentonite and from 0.5 to 0.8 percent calcium lignosulfonate.

To eliminate difficulties encountered in the field that appeared to be caused by excessive deposition of cement inside the casing, laboratory tests were made on compositions containing higher percentages of bentonite. The preliminary tests showed that the deposition of solids by filtration could be reduced substantially by an increase in the bentonite concentration to about 25 percent. In order to determine the correct amount of calcium lignosulfonate to be used with cements containing 25 percent bentonite, a series of tests was made under conditions simulating temperatures and pressures that are encountered in permanent-type squeeze operations.

Although laboratory results are not exhaustive, sufficient data have been obtained to make recommendations on the preparation and use of cements containing either 12 percent or 25 percent bentonite with the correct

Here's the Answer for SHALLOW WELL SERVICING!

COOPER–ALLIS-CHALMERS

Model B125-20 SKID WINCHES

For Servicing to 1,500 ft. of 2½" Tubing

Now a new COOPER—ALLIS-CHALMERS servicing winch for less money than most used equipment will cost.

In any kind of country—New York-Ohio-Kansas-Oklahoma-Texas-Colorado—these husky little units are proving that it is folly to waste time and money on worn out, used equipment in servicing shallow wells.

Powered by ALLIS-CHALMERS Model B-125 engine—the engine built especially for heavy duty stationary work.

Regardless of the depth of wells, there is a Cooper-Allis-Chalmers Winch of the right capacity to do the job economically.

FRED E. Cooper, Inc.

P. O. BOX 1890 TULSA, OKLA.

Houston · Odessa · Los Angeles · Olney

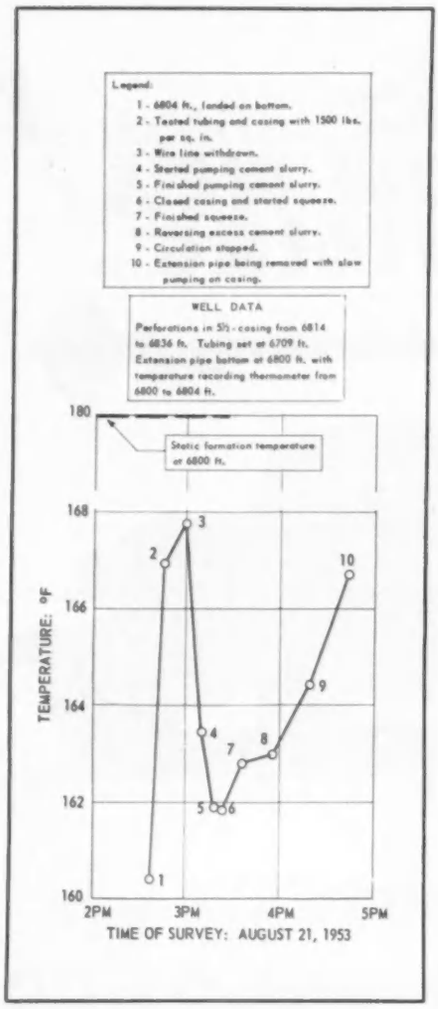

Legend:
1 - 6804 ft., landed on bottom.
2 - Tested tubing and casing with 1500 lbs. per sq. in.
3 - Wire line withdrawn.
4 - Started pumping cement slurry.
5 - Finished pumping cement slurry.
6 - Closed casing and started squeeze.
7 - Finished squeeze.
8 - Reversing excess cement slurry.
9 - Circulation stopped.
10 - Extension pipe being removed with slow pumping on casing.
WELL DATA
Perforations in 5½ - casing from 6814 to 6836 ft. Tubing set at 6709 ft. Extension pipe bottom at 6800 ft. with temperature recording thermometer from 6800 to 6804 ft.
Static formation temperature at 6800 ft.
TEMPERATURE: °F
180
168
166
164
162
160
2PM
3PM
4PM
5PM
TIME OF SURVEY: AUGUST 21, 1953

Fig. 1—Temperature during squeeze cementing of a Texas Gulf Coast well.

amounts of calcium lignosulfonate for squeeze cementing in accord with the permanent-type well completion method. Also, sufficient field experience has been obtained to demonstrate the utility of cements containing bentonite and calcium lignosulfonate for permanent-type workover operations.

Squeeze-cementing temperatures. The temperature of the slurry during cementing operations is an important consideration because high temperatures accelerate the setting of cement. This is especially critical in squeeze-cementing since the excess slurry must be removed from the well by reverse-circulation. In a squeeze job employing the permanent-type well completion technique usually very little circulation occurs after the extension pipe is in position. Furthermore, the well is likely to have been quiescent for some time prior to placement of the extension pipe. Inasmuch as information on the temperature of cement slurry placed in wells under these conditions was not available, arrangements were made to record the slurry temperature during permanent-type squeeze operations on two Gulf Coast wells, one in Texas and one in Louisiana.

In order to obtain complete information on the relationship between cementing temperature and formation temperature, several temperature surveys were made prior to and after the cementing of these wells. On the Texas Gulf Coast well, the first survey was made soon after the well was killed by circulation of approximately 175 barrels of salt water through tubing at 6709 feet and immediately prior to cementing. This survey, which showed 151° F. at 6600 feet and 167° F. at 6800 feet, indicated that some cooling was effected by the circulation of salt water.

A survey immediately after cementing showed 166° F. at 6600 feet and 167° F. at 6800 feet. Another survey, 16 hours after cementing showed 174° F. at 6600 feet and 175° F. at 6800 feet.

In addition, a shut-in temperature survey that was made in an offset well showed 176° F. at 6600 feet and 180° F. at 6800 feet. When these data were considered in connection with the temperature data obtained during the squeeze job, presented in Figure 1, two interesting observations were noted: (1) maximum temperature of slurry during squeeze operations was approximately 163° F., or 17° F. below static formation temperature, and (2) after squeezing, the temperature slowly returned to near formation temperature.

Similar temperature data were obtained on the Louisiana Gulf Coast well, except that the survey immediately prior to cementing was made as the extension pipe was lowered into position. About 17 hours prior to cementing, approximately 200 barrels of salt water were pumped into the casing to wash sand from the bottom of the well through the use of telescoping extension pipe. Afterwards, no circulation was done until cementing operations were started. The survey which was taken as the extension pipe was lowered into position to do the squeeze job showed 198° F. at 9600 feet and 205° F. at 10,115 feet.

A survey immediately after cementing showed 196° F. at 9600 feet and 202° F. at 10,100 feet. Another survey 12 hours after cementing showed 198° F. at 9600 feet and 205° F. at 10,100 feet.

From results obtained on numerous drill-stem tests in this field, the static formation temperature was estimated to be 210° F. Consideration of the above data in connection with the temperature data obtained during the squeeze job, presented in Figure 2, revealed that the maximum temperature of the slurry during squeeze operations was approximately 200° F. or about 10° F. below estimated static formation temperature.

In summary, temperature data on two wells indicated that the temperatures encountered in permanent-type squeeze operations were only a few degrees below static formation temperature. It was felt, therefore, that for practical field purposes, the cementing temperature should be considered to be equivalent to the static

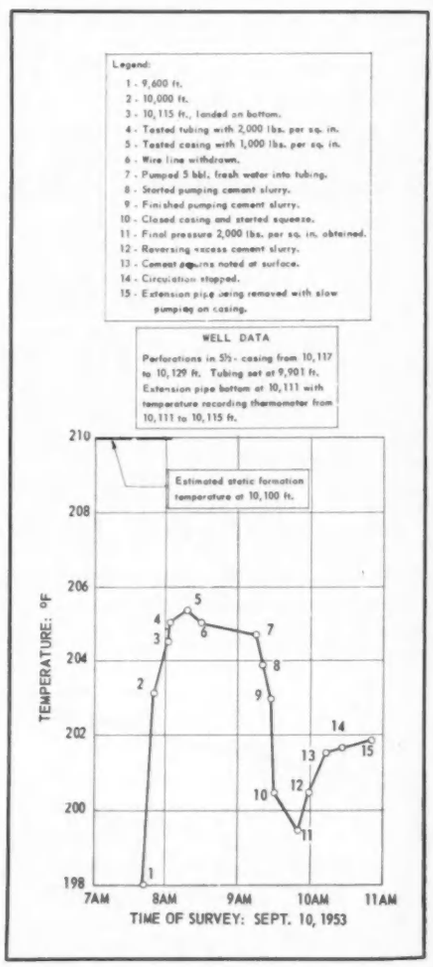
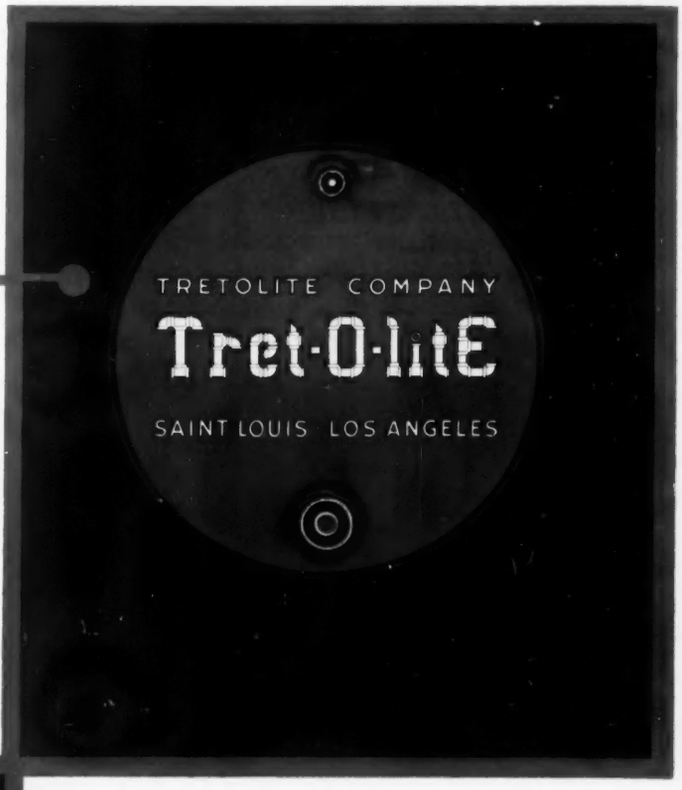
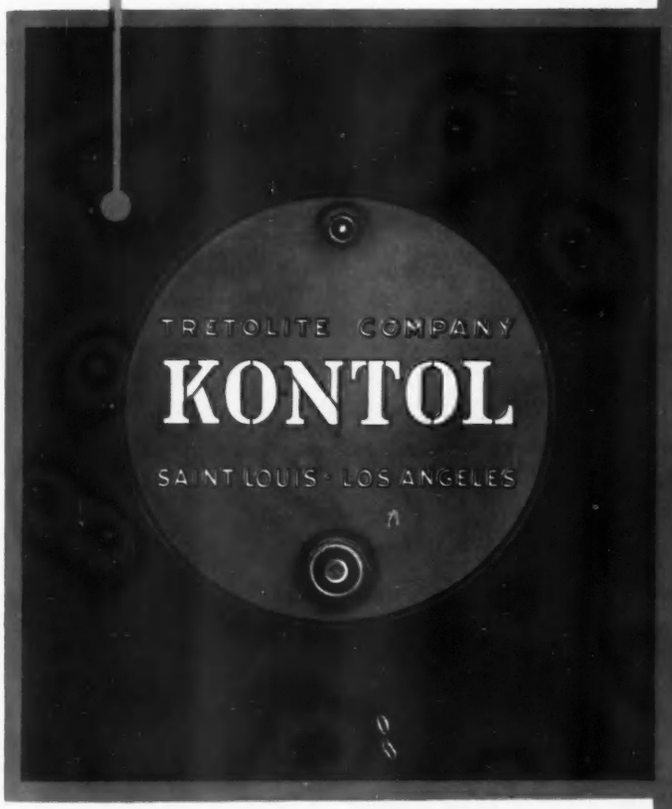

Legend:
1 - 9,600 ft.
2 - 10,000 ft.
3 - 10,115 ft., landed on bottom.
4 - Tested tubing with 2,000 lbs. per sq. in.
5 - Tested casing with 1,000 lbs. per sq. in.
6 - Wire line withdrawn.
7 - Pumped 5 bbl. fresh water into tubing.
8 - Started pumping cement slurry.
9 - Finished pumping cement slurry.
10 - Closed casing and started squeeze.
11 - Final pressure 2,000 lbs. per sq. in. obtained.
12 - Reversing excess cement slurry.
13 - Cement returns noted at surface.
14 - Circulation stopped.
15 - Extension pipe being removed with slow pumping on casing.
WELL DATA
Perforations in 5½ - casing from 10,117 to 10,129 ft. Tubing set at 9,901 ft. Extension pipe bottom at 10,111 with temperature recording thermometer from 10,111 to 10,115 ft.
Estimated static formation temperature at 10,100 ft.
TEMPERATURE: °F
210
208
206
204
202
200
198
7AM
8AM
9AM
10AM
11AM
TIME OF SURVEY: SEPT. 10, 1953

Fig. 2—Temperature during squeeze cementing of a Louisiana Gulf Coast well.

FOR ECONOMICAL DEMULSIFICATION:



FOR EFFECTIVE CORROSION PREVENTION:



These well-established Tretolite Company products have been providing effective, economical assistance to producers for years.

Whenever you have a production problem involving demulsification, corrosion, scale accumulation, oil-in-water emulsification or paraffin accumulations, call on Tretolite. We have the know-how and the service facilities to help you ...*right now*.

Chemicals and Services for the Petroleum Industry

DEMULSIFYING • WATER DE-OILING

CORROSION INHIBITING • SCALE PREVENTING

DESALTING • PARAFFIN REMOVING

TRETOLITE COMPANY

A DIVISION OF PETROLITE CORPORATION

369 Marshall Avenue, Saint Louis 19, Missouri

5515 Telegraph Road, Los Angeles 22, California

TKF 54-6

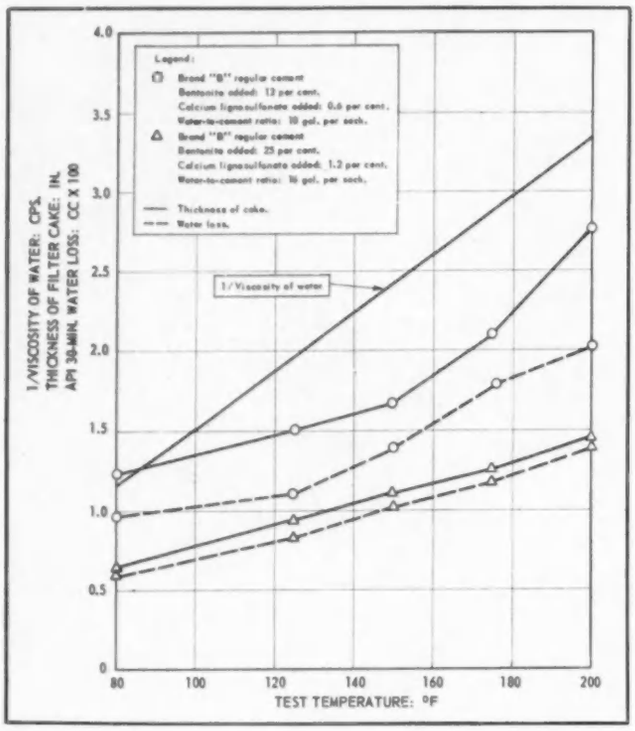


Fig. 3—Effect of temperature on filtration properties of modified cement slurries.

formation temperature for planning permanent-type squeeze jobs.

Properties of Bentonitic cements under squeeze-cementing conditions.

Filtration properties—In order to squeeze with the extension pipe placed in or through a perforated section of casing, it is necessary to use a relatively low-water-loss slurry to keep cement solids from depositing tightly around the extension pipe and preventing removal of the excess cement by reverse-circulation.[2] This property of a suspension, such as cement slurry, is dependent primarily upon the permeability of the solids which are deposited by the application of a pressure differential across a permeable filter medium. The API low-presure wall-building mud tester, well known for the evaluation of the filtration properties of drilling muds, has been used in our laboratory study of the filtration characteristics of cement slurries.

Previous work has shown that the filtration rates of conventional neat cement slurries were very high and that the filtration rates were reduced drastically by the addition of bentonite and calcium lignosulfonate to the cement.[4] These facts are demonstrated by the data presented in Table 1. Neat slurries prepared from conventional cements gave extrapolated 30-minute API filtration rates of 600 to 800 cc; a slurry prepared from cement containing 12 percent bentonite and 0.6 percent calcium lignosulfonate filtered 96 cc in the same test; and a slurry prepared from cement containing 25 percent bentonite and 1.2 percent calcium lignosulfonate filtered 58 cc.

The effect of temperature on the filtration properties of cements containing bentonite and calcium lignosulfonate is shown in Figure 3. The filtration rate and filter cake thickness increased as the test temperatures were raised from 80 to 200° F. but the permeability did not change very much. Apparently, the increase in filtration rate and filter cake thickness were caused primarily by the reduction in the viscosity of water at the higher test temperatures. Although no tests were made above 200° F., it is likely that the filtration rate and filter cake thickness would increase gradually as the viscosity of water decreased.

In permanent-type squeeze cementing, as a cement filter cake of sufficiently low permeability fills the small area of the perforation holes and forms small nodes inside the casing, two desirable conditions apparently are established:

- Retention of sufficient water in the slurry to maintain good fluidity so that the excess cement can be removed by reverse-circulation.
- Restriction of the deposition of cement solids inside the casing to prevent interference with the removal of the extension pipe and other subsequent operations.

Field experience in one area indicated that the reduction in the per-

Table 1
Filtration Properties of Cement Slurries With and Without Bentonite and Calcium Lignosulfonate Added

Identity of Cement	Additives, Wt. Percent of Cement		Water Content Gallon Water Per Sack Cement	API Water Loss at 80°F. and 100 Lbs. Per Sq. In.				Thickness of Filter Cake in.	Permeability of Filter Cake md.
	Bentonite	Calcium Lignosulfonate		1 min.	7½ min.	15 min.	30 min.		
Slow-set, Brand "A"[1]	0	0	4.5	132	390[2]	560[2]	800[2]	3.0[3]	24.8[3]
Regular Portland, Brand "B"	0	0	5.2	94	280[2]	410[2]	600[2]	2.4[3]	14.4[3]
Regular Portland, Brand "B"	12	0.6	10.0	12	42	65	96	1.22[4]	0.24[4]
Regular Portland, Brand "B"	25	1.2	16.0	7	25	38	58	0.62[4]	0.08[4]

[1] A slow-setting cement—tested for reference data.
[2] Data obtained by extrapolation.
[3] Thickness of filter cake at end of 1 min. Instantaneous permeability calculated on data at end of 1 min.
[4] Thickness of filter cake at end of 30 min. Instantaneous permeability calculated on data at end of 30 min.

Table 2
Effect of Salt Water on Filtration Rate of Slurries Prepared from Cement Containing Bentonite and Calcium Lignosulfonate

Identity of Cement	Additives, Wt. Percent of Cement		Water Content Gallon Water Per Sack of Cement	Concentration of Sodium Chloride in Mix Water, ppm.	API Water Loss at 80°F. and 100 Lbs. Per Sq. In., cc			
	Bentonite	Calcium Lingonsulfonate			1 min.	7½ min.	15 min.	30 min.
Regular Portland, Brand "C"	12	0.5	10	0	24	74	110	159
Regular Portland, Brand "C"	12	0.5	10	10,000	34	102	150	216
Regular Portland, Brand "C"	12	0.5	10	100,000	52	148	210	300[1]

[1] Data obtained by extrapolation.

LOOK FOR THE GREEN RODS

Ordinary steels do not pass the high requirements set for Jones sucker rods. Only carefully selected steels that meet laboratory tests are acceptable. What's more, they must pass a series of controls throughout fabrication. This is another assurance of uniform quality when you run the green rods.

JONES SUCKER RODS

P·E·S·A
PETROLEUM EQUIPMENT SUPPLIERS ASSOCIATION
PARTNERS IN PETROLEUM PROGRESS

THE S. M. JONES COMPANY
Division of Buffalo-Eclipse Corporation
General Office and Factory: TOLEDO, OHIO
Sales Office: Kennedy Building, TULSA, OKLA.
Export Sales Office: Buffalo International Corp.
50 Church Street, N. Y. C.

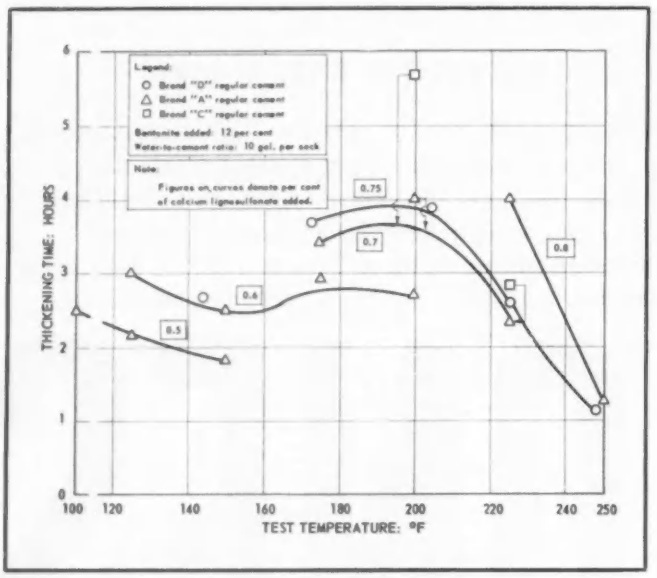


Fig. 4—Effect of temperature on thickening times of modified cements.

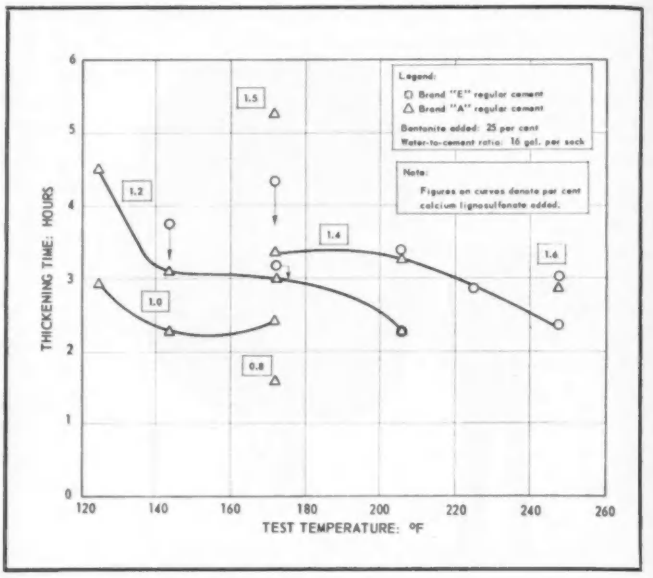


Fig. 5—Effect of temperature on thickening times of modified cements.

meability of cement filter cake effected by the addition of 25 percent bentonite was sufficient to eliminate difficulties caused by excessive node buildup that were experienced with cements containing 12 percent bentonite.

Data presented in Table 2 showed that salt water should not be used in the preparation of bentonitic cement slurries for permanent-type squeeze operations because the filtration rate was substantially increased by the presence of salt. In addition, the setting of cements is often accelerated by salt water.

Thickening time—In addition to satisfactory filtration properties, a cement composition for use in permanent-type squeeze operations must remain pumpable long enough for placement in the well and for removal of any excess slurry by reverse-circulation. This property was evaluated in the laboratory by the use of a Stanolind-type pressure consistometer wherein temperatures and pressures encountered in the field were imposed upon the cementing composition.

In order to simulate permanent-type squeeze cementing as near as possible, thickening-time tests were made by increasing the temperature of the compositions from room temperature to test temperature within approximately 30 minutes. Pressure was increased as the temperature increased with final pressure being reached in approximately 30 minutes. Final pressures varied from approximately 5000 pounds per square inch for the 100° F. tests to approximately 15,000 pounds per square inch for the 250° F. tests. These schedules were followed because results of temperature surveys, which have been discussed previously, indicated that the slurry reached a temperature near that of the formation almost simultaneous with placement.

Data presented in Figures 4 and 5 showed that the thickening times of regular cements containing either 12 percent or 25 percent bentonite were shortened by increasing the test temperature and were lengthened by increasing the concentration of calcium lignosulfonate. It might be reasoned, therefore, that large concentrations of calcium lignosulfonate should be used for all jobs in order to assure long pumpability.

Unfortunately, as the thickening time is lengthened by the addition of a retarder, such as calcium lignosulfonate, more time must be allowed for the development of strength. In view of these factors the tentative recommendations presented in Table 3 were made for the addition of calcium lignosulfonate to regular portland cements containing either 12 percent or 25 percent bentonite for permanent-type squeeze operations.

Thickening times of two hours or longer were obtained with regular portland cement containing 12 percent bentonite by varying the amount of calcium lignosulfonate from 0.5 to 0.8 percent for temperatures up to 250° F. Similarly, thickening times of 2½ hours or longer were obtained with regular portland cement containing 25 percent bentonite by varying the amount of calcium lignosulfonate from 1.0 to 1.6 percent. Thickening times of two hours usually afford ample time for the completion of permanent-type squeeze jobs.

Table 3
Concentrations of Calcium Lignosulfonate in Cements Containing Bentonite for Permanent-Type Squeeze Operations

	Additives to Regular Portland Cements,[1] weight percent[2]	
Maximum Formation Temp.,°F	Bentonite[3]	Calcium Lignosulfonate[4]
Below 140	12	0.5
140—180	12	0.6
180—220	12	0.7
220—250[5]	12	0.7—0.8
Below 125	25	1.0
125—175	25	1.2
175—225	25	1.4
225—250[5]	25	1.6

[1] Only regular portland cements—sometimes referred to as normal or common cements—should be used. Slow-setting cements **must not be** used in the preparation of high-bentonite cementing compositions.

[2] Bentonite and calcium lignosulfonate additions are based on the weight of cement. For example, 12 percent bentonite in cement means 100 lbs of cement and 12 lbs of bentonite.

[3] Bentonite should be a good grade of montmorillonite, free of peptizers, such as soda ash, that might accelerate the setting of cement.

[4] Calcium lignosulfonate should be uniform and dependable in its dispersion of the slurry and its retardation of the setting time of the slurry.

[5] In this temperature range, it is desirable to run a laboratory test using the particular cement prior to squeezing the well in the field. If this is not practical, the well should be cooled after the extension pipe is in position by circulating the equivalent of at least one volume of the system immediately prior to mixing cement slurry. Laboratory data on cements containing bentonite for squeeze cementing at temperatures above 250°F have not been obtained.

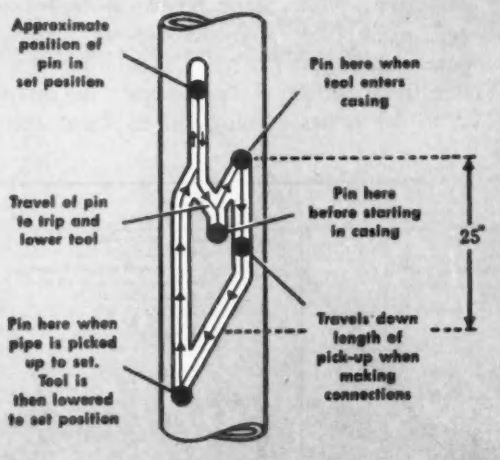
Strength—In an attempt to obtain strength data representative of the

No rotation required

Another Fluid Packed Pump Company Exclusive . . .

oilmaster INSERT PUMP ANCHOR

a tool designed to anchor an insert pump at any point in the tubing


Approximate position of pin in set position
Pin here when tool enters casing
Travel of pin to trip and lower tool
Pin here before starting in casing
25"
Pin here when pipe is picked up to set. Tool is then lowered to set position
Travels down length of pick-up when making connections

CAN BE SET WITH VERTICAL MOVEMENT ONLY

CAN BE RESET WITHOUT ROUND TRIPPING

CAN BE SET WITHOUT ROTATION

Manufactured under license from Knowlton Oil Tool Co.

Write for descriptive literature

FLUID PACKED PUMP COMPANY

MAIN OFFICE AND PLANT, LOS NIETOS, CALIFORNIA

Distributed by The National Supply Co., Pittsburgh, Pa.
Export: The National Supply Co., Inc., Export Division, 600 Fifth Ave., New York
Co-Distributors: Berry Supply Store, Beacon Supply Co., Industrial Supply Co.

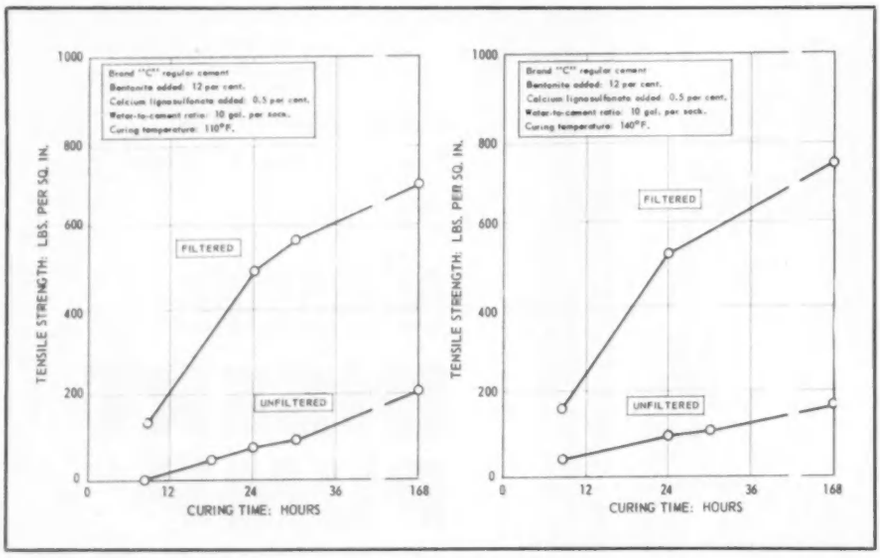


Fig. 6—Strength development of filtered and unfiltered modified cement slurries.

cement remaining in the well after completion of a squeeze job, strength tests were made on both unfiltered cement slurry and filtered cement cake. For tests on the filtered cement, the slurry was poured over briquet molds resting in the bottom of a large filter chamber and a pressure of 100 psi was applied to cause deposition of cement cake in the molds.

Then, the specimens were removed and placed under water at the desired test temperature. For tests on the unfiltered mass, the slurry was poured directly into briquet molds. The results obtained on the filtered mass should give information on the strength of the cement deposited behind the casing and in the perforation holds, whereas the results obtained on the unfiltered slurry should furnish information on the strength of the cement remaining inside the casing (on plugback jobs).

Strength data on cement containing 12 percent bentonite and varying concentrations of calcium lignosulfonate at four different temperatures are presented in Figures 6 and 7. Similar data on cement containing 25 percent bentonite and varying concentrations of calcium lignosulfonate are presented in Figures 8 and 9.

For cement containing 12 percent bentonite, the filtered mass developed tensile strength of 30 to 160 psi within eight hours and 200 to 400 psi within 12 to 18 hours, whereas the unfiltered mass required about 18 hours to develop 50 to 130 psi. In seven days, the filtered mass had strengths of from 700 to 1000 psi and the unfiltered mass has strengths of approximately 200 psi.

For cement containing 25 percent bentonite, the filtered mass required 18 to 24 hours to develop tensile strengths of about 200 psi at 110, 125, and 175° F., whereas the unfiltered mass had no strength at 18 hours and only 20 to 100 psi at the end of 24 hours at these temperatures. At 225° F., the filtered mass from cement containing 25 percent bentonite developed 575 psi within 20 hours while the unfiltered mass tested 150 psi. At all test temperatures, the filtered mass had strengths of from 500 to 600 psi after seven days and the unfiltered mass had strengths of approximately 130 psi after seven days. These data indicated that at least 12 to 18 hours should be allowed for the strength development of cements containing 12 percent bentonite and the recommended concentrations of calcium lignosulfonate and that at least 18 to 24 hours should be allowed for cements containing 25 percent bentonite and the recommended concentrations of calcium lignosulfonate.

Slurry volume—Methods of calculation of the volume of cement slurry obtained from cements containing either 12 or 25 percent bentonite are discussed and illustrated in Appendix A.

Field experience. Approximately 160 squeeze jobs using cements containing bentonite and employing the permanent-type workover procedure have been done during the past year. In addition, bentonitic cements have been used on approximately 50 jobs where the low-pressure squeeze technique was employed in conjunction with conventional rigs or pulling units. These jobs have ranged in depth from 1800 feet to 11,115 feet with formation temperatures up to approximately 250° F.

Cements containing 12 percent bentonite were used on about 165 jobs and cements containing 25 percent bentonite were used on the other 45 jobs. The calcium lignosulfonate contents have varied from 0.5 to 0.8 percent for cements containing 12 percent bentonite and from 1.2 to 1.6 percent for cements containing 25 percent bentonite.

In general, the bentonitic cement compositions have given satisfactory

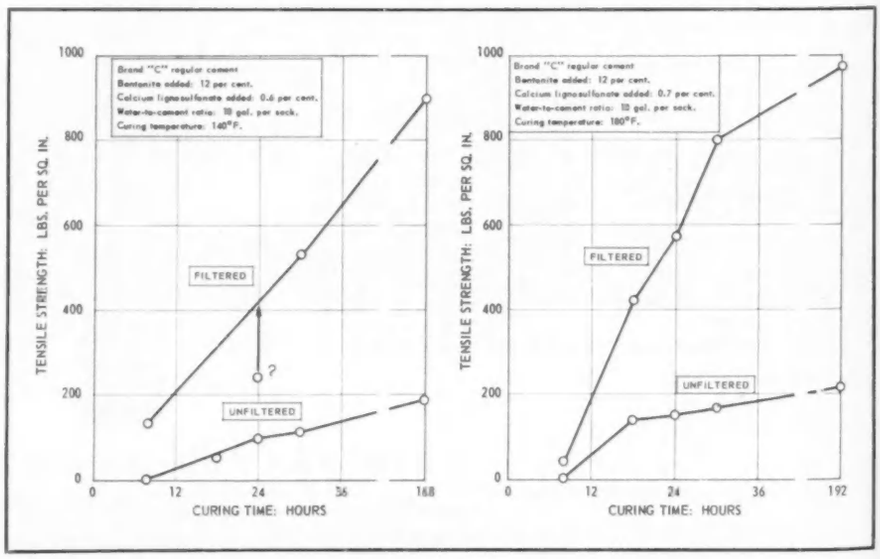


Fig. 7—Strength development of filtered and unfiltered modified cement slurries.

When you buy a New Gulfco Head

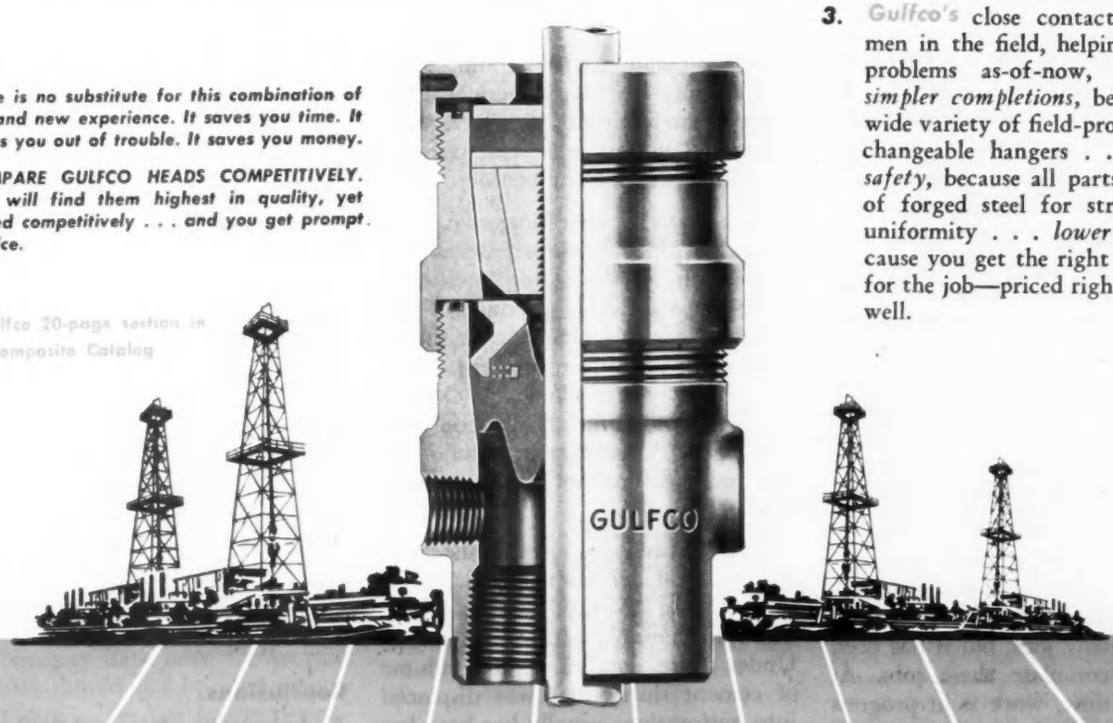
. . . you get the advantages of the latest, up-to-the-minute Gulfco experience in the field . . . plus . . . the benefits resulting from Gulfco's third-of-a-century of oil industry experience.

1. Gulfco's research and development engineers keep Gulfco products modern.
2. Gulfco's 34 years' oil industry experience, pioneering the use of forged steel and other advancements in both material and methods, keeps Gulfco products safe.
3. Gulfco's close contact with the men in the field, helping to solve problems as-of-now, results in *simpler completions*, because of a wide variety of field-proven, interchangeable hangers . . . *greater safety*, because all parts are made of forged steel for strength and uniformity . . . *lower costs*, because you get the right equipment for the job—priced right for every well.

There is no substitute for this combination of old and new experience. It saves you time. It keeps you out of trouble. It saves you money.

COMPARE GULFCO HEADS COMPETITIVELY. You will find them highest in quality, yet priced competitively . . . and you get prompt service.

See Gulfco 20-page section in Composite Catalog



SOLD EXCLUSIVELY THROUGH SUPPLY STORES

FORGED STEEL
WELL HEAD EQUIPMENT
. . . for Safety

GULF COAST MACHINE & SUPPLY CO.

GULF COAST MACHINE & SUPPLY CO. GULFCO TRADE MARK PRODUCTS BEAUMONT, TEXAS.

GENERAL OFFICE AND SHOP: 305-315 Orange Street, P. O. Box 1150 — Phone 2-8481, BEAUMONT, TEXAS

SALES OFFICES AND WAREHOUSE STOCKS: HOUSTON, TEXAS: 6823 Navigation Blvd., Ph. FA-1544 • CORPUS CHRISTI, TEXAS: 3407 Agnes St., Ph. 2-5361 • ODESSA, TEXAS: 100 N. Texas St., Ph. 2-2895 • WICHITA FALLS, TEXAS: 1213 Indiana St., Ph. 2-9407 • CASPER, WYO.: 1669 East F. St., Ph. 2-0809 • GREAT BEND KANSAS: East 10th St., Ph. 4341

NEW YORK EXPORT OFFICE: R. S. Stokvis & Sons, Inc., 17 Battery Place, New York 4, N. Y.

5079

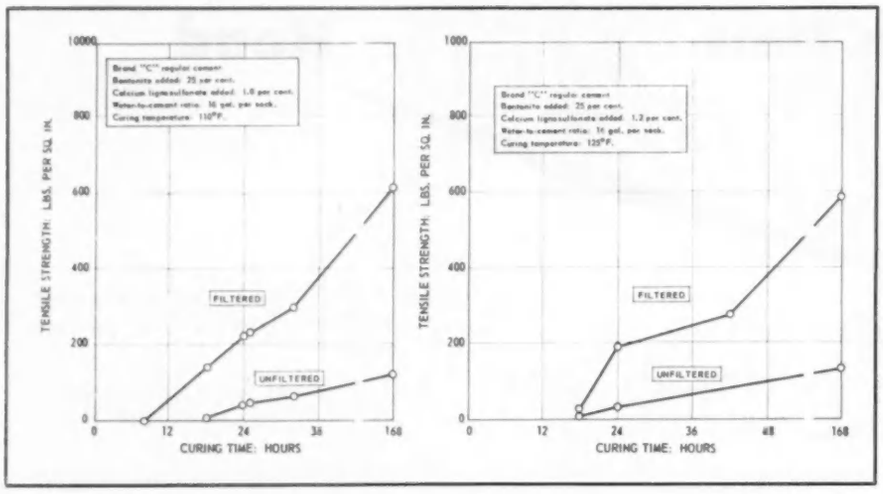


Fig. 8—Strength development of filtered and unfiltered modified cement slurries.

performance, however, certain difficulties have been encountered. Cement has set before completion of the squeeze job on about five or six occasions. On two or three of these jobs, it appeared that improper or inadequate dry mixing of the cement, bentonite, and calcium lignosulfonate caused premature setting. On the other jobs, an experimental procedure was attempted in an effort to block communication between two sands by one squeeze into an intervening shale section, and the cement was kept in the hole longer than its safe pumpability time before reverse-circulation was attempted.

Poor slurry mixing has given considerable concern and probably has caused higher reversing pressure than desired on many jobs, but it has been possible to complete these jobs. At the present time, work is in progress to improve both the dry mixing and slurry mixing. Difficulty in getting the tubing gun back through perforated sections of casing that had been squeezed with the extension pipe positioned below perforations was experienced with cements containing 12 percent bentonite in one area of East Texas.

This trouble which appeared to be caused by excessive cement filter cake or node build up inside the casing has not been experienced in other areas of the company's operations. The difference in this field experience may be due to variations in the filtration rates of the cement slurries, but a firm conclusion about this difference has not been made. Improvement in the filtration properties through the addition of more bentonite apparently has eliminated this trouble since no difficulty has been experienced on approximately 45 jobs that have been performed in this area with cements containing 25 percent bentonite.

Two squeeze operations with the extension pipe positioned below the perforations in the casing have been made in wells where production was obtained from fractured limestone. These jobs were unsuccessful because the cement slurry flowed back into the well bore after the squeeze was completed. A satisfactory solution to this problem has not been obtained to date.

Squeeze pressures have varied from 400 to 2500 psi with specific effort being made to keep the pressures below formation fracturing pressures. Under these conditions, the volume of cement slurry that was displaced into perforations usually has been less than five barrels. Many jobs have been performed successfully with less than one barrel of slurry; only a few jobs have required more than ten barrels of slurry. After a sustained or "locked-in" pressure has been obtained, the time for maintaining the squeeze pressure has varied from 3 to 45 minutes; however, the average time has been about 10 to 15 minutes.

No relationship between squeeze pressure, volume of slurry, or time of squeezing and successful results has been noted. About 90 percent success has been experienced on the first attempt on plug-back jobs. On jobs with the extension pipe positioned through perforations, about 80 percent success has been experienced on the first attempt where the perforations were never exposed to drilling mud; whereas, about 50 percent of the jobs where the perforations had been exposed to drilling mud required more than one squeeze. Waiting-on-cement times after completion of the squeeze jobs have varied from 12 to 36 hours.

The elimination of drilling mud during original completion and subsequent operations appeared to be the most important factor in the accomplishment of good squeeze jobs. The necessity of obtaining a definite and sustained squeeze pressure has not been firmly established, but it certainly appears to be a desirable condition. Whether the sustained and final squeeze pressure was 400 to 2500 psi has not appeared to be significant.

Conclusions.

1. Laboratory data and field experience have shown that neat cement

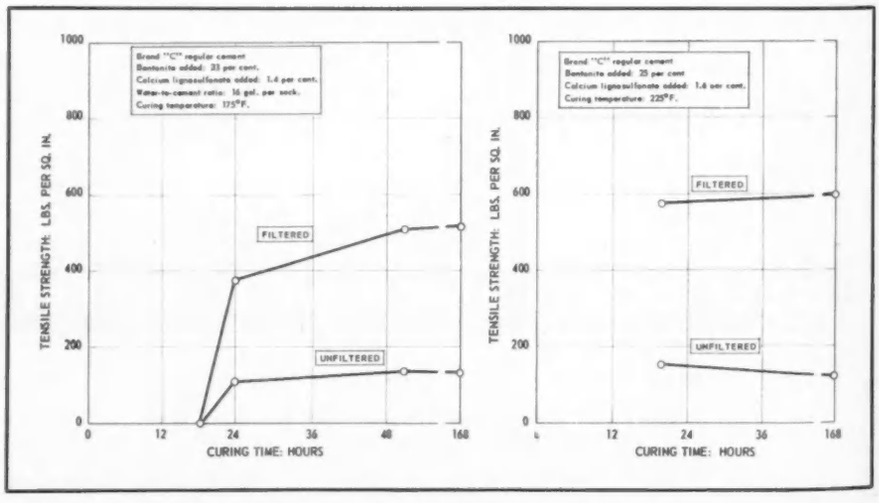


Fig. 9—Strength development of filtered and unfiltered modified cement slurries.

slurries were not suitable for use in the permanent-type workover procedure, whereas slurries prepared from regular portland cements containing bentonite and calcium lignosulfonate were satisfactory.

2. For plug-back operations where the tubing or extension pipe were positioned above the perforations in the casing, laboratory data and field experience have shown that regular portland cements containing 12 percent bentonite and from 0.5 to 0.8 percent calcium lignosulfonate were satisfactory.

3. For operations where the tubing or extension pipe were positioned below the perforations in the casing, difficulty which apparently was caused by excessive cement filter cake deposition inside the casing has been encountered on several jobs with the use of regular portland cements containing 12 percent bentonite and 0.5 to 0.8 percent calcium lignosulfonate. This difficulty apparently has been eliminated through the use of regular portland cements containing 25 percent bentonite and 1.2 to 1.6 percent calcium lignosulfonate.

4. Laboratory data and field experience have shown that dry mixing of the cement, bentonite, and calcium lignosulfonate and that good slurry mixing were critical factors that must be properly controlled for good results.

5. Laboratory data have shown that salt water should not be used to mix cement slurries for use in the permanent-type workover procedure.

6. The results of several temperature surveys on two wells where the permanent-type workover procedure was used have indicated that the temperature of cement slurry during squeeze operations was only a few degrees below static formation temperature.

REFERENCES

[1] Huber, T. A., and Tausch, G. H.: "Permanent-Type Well Completion," *Trans. A.I.M.E.* (1953), 198, 11.

[2] Huber, T. A., Tausch, G. H., and Dublin, J. R., III: "A Simplified Cementing Technique for Recompletion Operations," *Trans. A.I.M.E.* (1954), 201, 27.

[3] Morgan, B. E., and Dumbauld, G. K.: "A Modified Low-Strength Cement," *Trans A.I.M.E.* (1951), 192, 165.

[4] Morgan, B. E., and Dumbauld, G. K.: "Recent Developments in the Use of Bentonite in Cements," presented at API Southwestern Spring Meeting, Fort Worth, Texas, March 4-6, 1953.

[5] U. S. Patent 2,582,459, R. A. Salathiel, assigned to Standard Oil Development Company, Elizabeth, N. J.

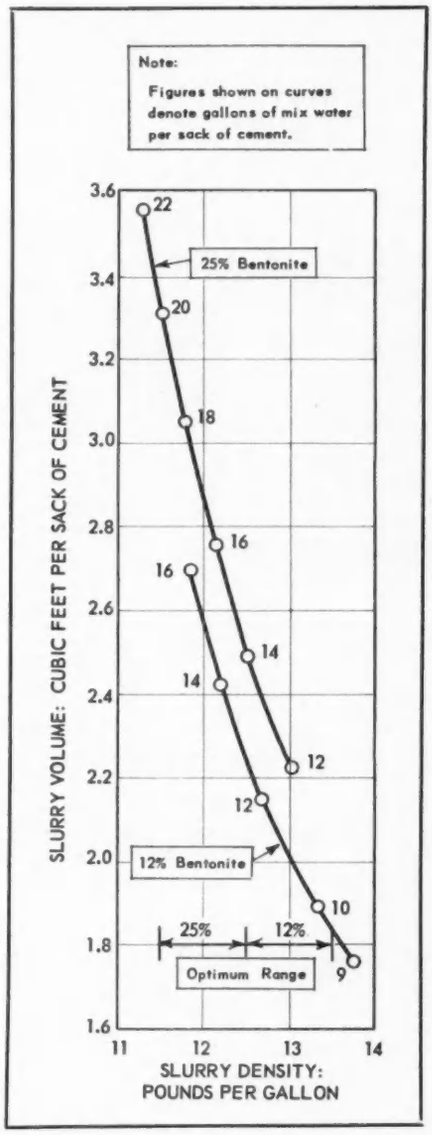


Fig. 10—Relation between density and volume of cement slurries containing bentonite.

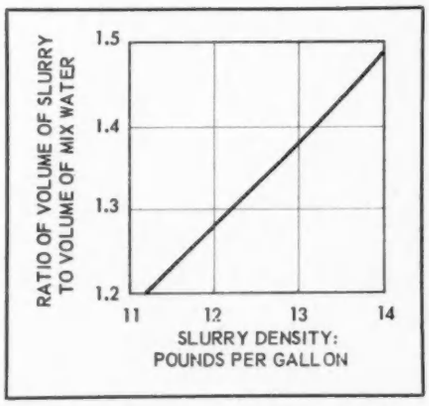


Fig. 11—Relation between density of cement slurries and volume of mix water.

APPENDIX A

Calculation of Slurry Volume—The volume of slurry obtained from a sack of cement containing bentonite is much greater than the volume of slurry obtained from a sack of cement containing no bentonite because more mix water is used. In the field, the slurry volume may be determined by weighing the slurry and using the data presented in Figure 10 to convert from slurry density to slurry volume.

For example, one sack of cement containing 12 percent bentonite produced 2.0 cubic feet of slurry weighing 13.0 pounds per gallon, and one sack of cement containing 25 percent bentonite produced 2.88 cubic feet of slurry weighing 12.0 pounds per gallon. If 10 barrels (56 cubic feet) of slurry were desired, either 28 sacks of cement containing 12 percent bentonite or 20 sacks of cement containing 25 percent bentonite would be required.

On location, it is desirable to know the volume of cement slurry. This may be accomplished through the use of either of the two following methods:

If the slurry were mixed to a given density and the volume of mix water were measured, the data in Figure 11 may be used to calculate the volume of slurry. For example, assume that 10 barrels of slurry were needed. Data presented in Figure 11 showed that one volume of mix water produced 1.38 volumes of 13.0 pounds per gallon slurry and one volume of mix water produced 1.28 volumes of 12.0 pounds per gallon slurry.

Therefore, $10 \div 1.38 = 7.25$ barrels of mix water were needed for a 13.0 pound-per-gallon slurry and $10 \div 1.28 = 7.8$ barrels of mix water were needed for a 12.0 pound-per-gallon slurry. The data in Figure 11 are applicable with cements containing either 12 or 25 percent bentonite. In the example cited above, cement containing 12 percent bentonite would be employed to obtain the 13.0 pound-per-gallon slurry and cement containing 25 percent bentonite would be used for the 12.0 pound-per-gallon slurry.

Calculation of the absolute volumes of the cement and bentonite and the measurement of the volume of the mix water are the basis for the other method. For example, one sack of cement containing 12 percent bentonite has an absolute volume of 4.11 gallons and one sack of cement containing 25 percent bentonite has an absolute volume of 4.66 gallons. If 28 sacks of 12 percent bentonite cement were mixed to a slurry density of 13.0 pounds per gallon, approximately 11 gallons of water per sack of cement would be required; hence, $28 \times 4.11 = 115$ gallons of cement and bentonite plus $28 \times 11 = 308$ gallons of water or $423 \div 42 = 10.1$ barrels of slurry would be obtained.

Likewise, if 20 sacks of 25 percent bentonite cement were mixed to a slurry density of 12.0 pounds per gallon, approximately 17 gallons of water per sack of cement would be required; hence, $20 \times 4.66 = 93$ gallons of cement and bentonite plus $20 \times 17 = 340$ gallons of mix water or $433 \div 42 = 10.3$ barrels of slurry would be obtained. In these calculations and in the data in Figures 10 and 11, the calcium lignosulfonate content was disregarded because its effect on density and volume is negligible.

The use of absolute volumes is the more accurate method of calculation if the exact amount of cement and bentonite are accurately known. If the amount of cement and bentonite is not accurately known or if more cement and bentonite than will be used for the job have been delivered to the location, the use of the data in Figure 11 is the better method of calculation of the slurry volume.

—**The End**

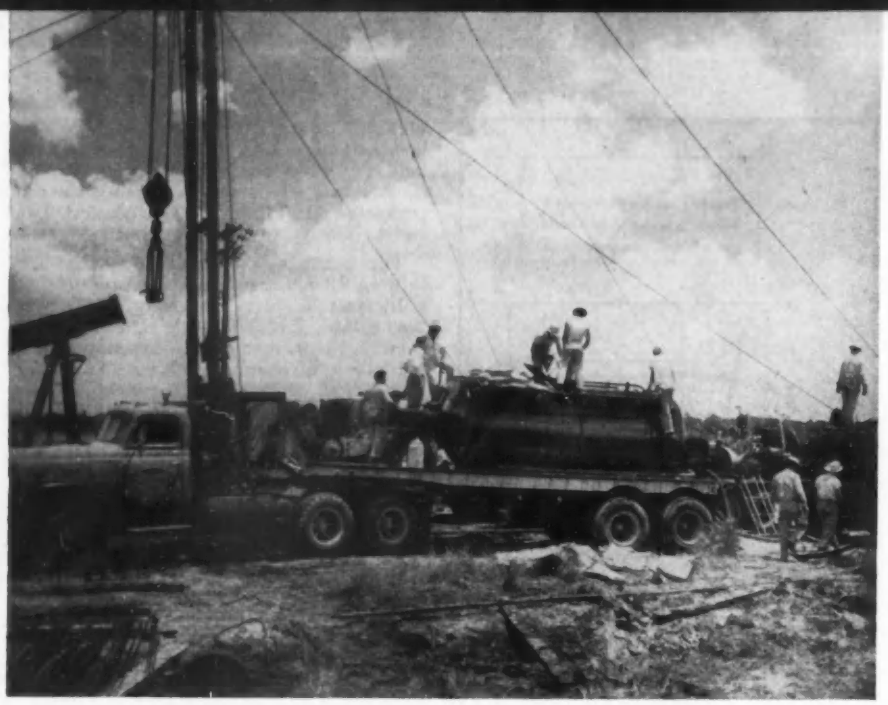


Fig. 1—Sand is blended into the carrying fluid at the well site in a special truck-mounted paddle-mixing tank.

New Sand Control Technique For Incompetent Formations

Here's a new idea to control sand production from unconsolidated beds that has met with more than usual success in the difficult Texas Gulf Coast.

By J. F. BOZEMAN, Dowell Incorporated, Houston

LARGE QUANTITIES of sand are pumped into unconsolidated producing formations using thickened fluids as carriers. Purpose of the coarse sand is to hold the formation in place and to increase materially the surface drainage area of the producing zone.

This increased drainage area is the result of openings created in the formation, the coarse sand filling the openings and forming wedges or lenses of sand through which the well fluids can migrate more easily to the well bore. These lenses of sand are particularly important where formations contain very fine flour-like particles. If the drainage area is increased, the pressure drop across the sand face is decreased, which reduces the tendency of the wells to "sand-up." A typical sand control treatment is shown in the schematic diagram of Figure 2.

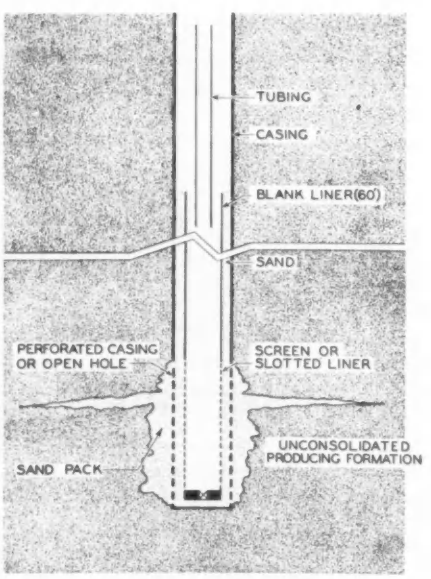


Fig. 2—Typical sand control completion showing the use of a screen or slotted liner. Effective drainage area is increased.

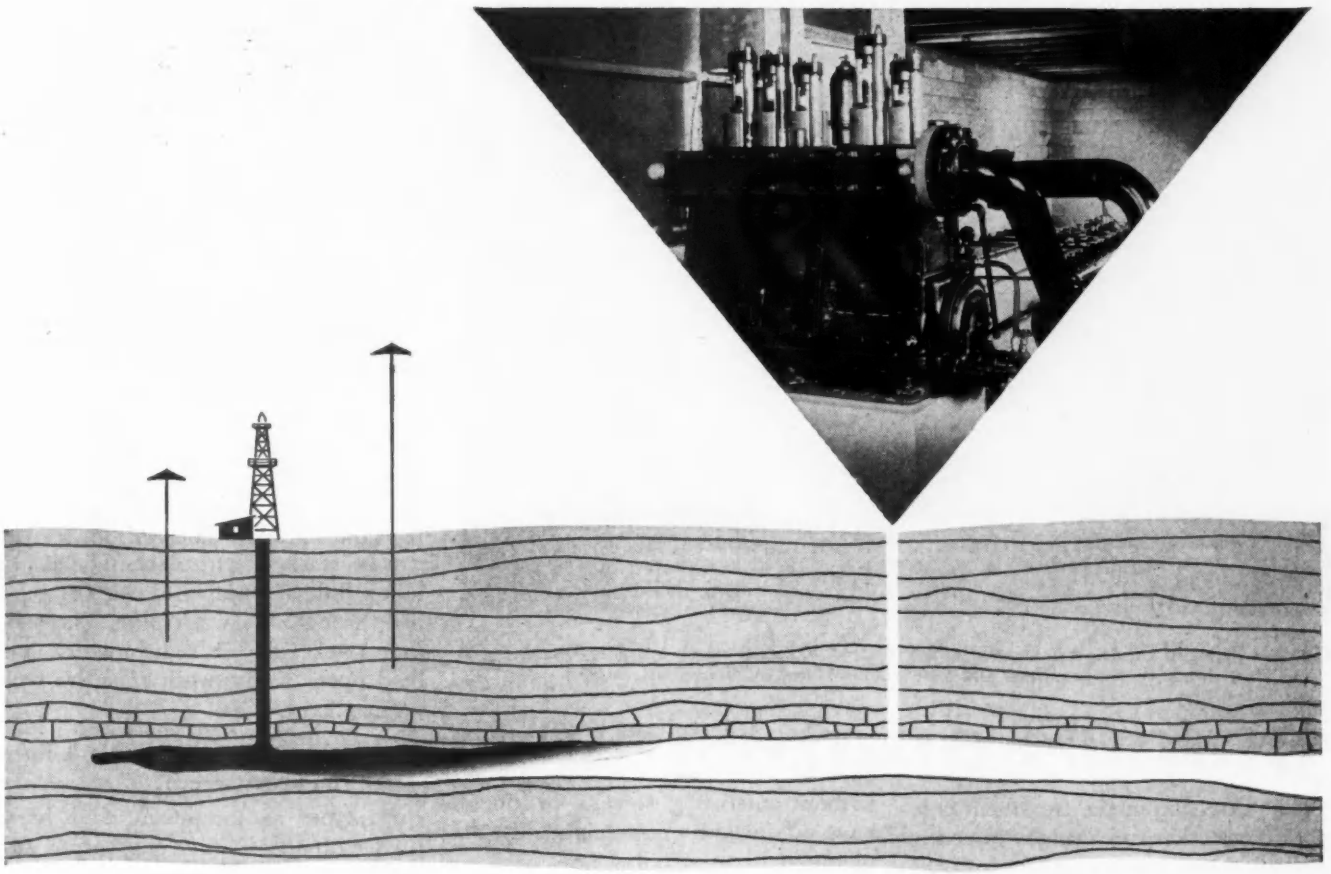
It is customary after placement of the coarse sand in the formation to install a suitable screen or liner in the well bore opposite the producing zone. Some applications have been made with sand consolidation plastics as a substitute for a screen or liner.[1,2] Sufficient treatments have been performed in many areas plagued with incompetent formations to prove the success of this new development.

Sand carriers. Fluids used for placement of sand with this technique are of three types: (1) hydrochloric acid-kerosine gels, (2) thickened oils, and (3) thickened salt water. These fluids, (Figure 3) while of sufficient viscosity to carry sand, break down in the formation and become low viscosity liquids. The hydrochloric acid-kerosine gels were the first fluids used in this technique. Now, their application is generally limited to high temperature wells (over 200° F.). Thickened lease crudes, kerosine or diesel oil are most frequently used to carry coarse sand into the well. Use of thickened salt water is a comparatively recent innovation for this method of sand control.

Sand used. The sands used are closely graded and are nearly pure silica.[3] Other sands may be used provided they are properly sized and graded. Sand particle sizes ranging from .010 to 0.79 inch in diameter are usually employed. (Table 1.) Many operators prefer the use of two sand sizes. One popular method is to use .016 to .033 inch sand for the major part of the treatment, followed by fluid containing coarser .033 to .079 inch sand. If the larger sand is used, a screen or liner with .020 inch openings (20 gauge) is set; if only the smaller sand is used, a 0.12 inch screen (12 gauge) is run.

The quantity of sand to be used has been determined on the basis of field experience, thickness of producing zone, and the previous history of the well. Table 2 lists examples of typical Texas Gulf Coast sand control treatments, together with quantities of materials used and results obtained.

Treating the well. The technique is simple. The usual practice requires that the well owner prepare his well by pulling the tubing and artificial lift equipment. The well then is cleaned out to bottom, or to some desired horizon. Care should be taken



USE ALDRICH Direct Flow pumps for water flooding

Outstandingly satisfactory performance at varying pressures in water flood installations throughout the country gives proof of quality.

- *high speed*—greater volume from more compact pumps.
- *low maintenance costs*—KOSMOS Porcelain Plungers and completely sectionalized fluid-ends reduce maintenance, material costs and down time.
- *complete range of sizes*—3″ Triplex, 5″ and 6″ Triplex and Multiplex units permit optimum combinations of pumps with maximum interchangeability of parts.
- *for corrosive service*—fluid-ends available in stainless steel or aluminum bronze.

Ask for proof of performance in any field.

the ALDRICH *pump company*

4 PINE STREET • ALLENTOWN, PENNSYLVANIA

. . . Originators of the Direct Flow Pump

Representatives: Bushnell Controls & Equipment Co., Inc., 5137 West Jefferson Blvd., Los Angeles 16, Calif. • Cross Pump & Equipment Co., P.O. Box 889, Charleston 23, W. Va. • Lloyd T. Gibbs Co., 1021 Petroleum Bldg., Tulsa 3, Okla. • R. B. Moore Supply Co., Bolivar, N. Y. • Walter Norris Engineering Co., Civic Opera Bldg., 20 North Wacker Drive, Chicago 6, Ill. • Power Specialty Co., P.O. Box 6365, 2000 Kipling Street, Houston 6, Texas; The Suburban Bldg., Room 204, 5526 Dyer Street, Dallas 6, Texas • B. G. Harmon Service & Equipment Co., P. O. Box 309 (Farm Bureau Bldg.), Carmi, Ill. • Stearns-Roger Manufacturing Co., 1720 California Street, Denver 2, Colo. • Export: Petroleum Machinery Corporation, 30 Rockefeller Plaza, New York 20, N. Y.

Direct Flow Spare Parts Stock—at Carmi, Ill., Houston, Los Angeles, Odessa, and Tulsa

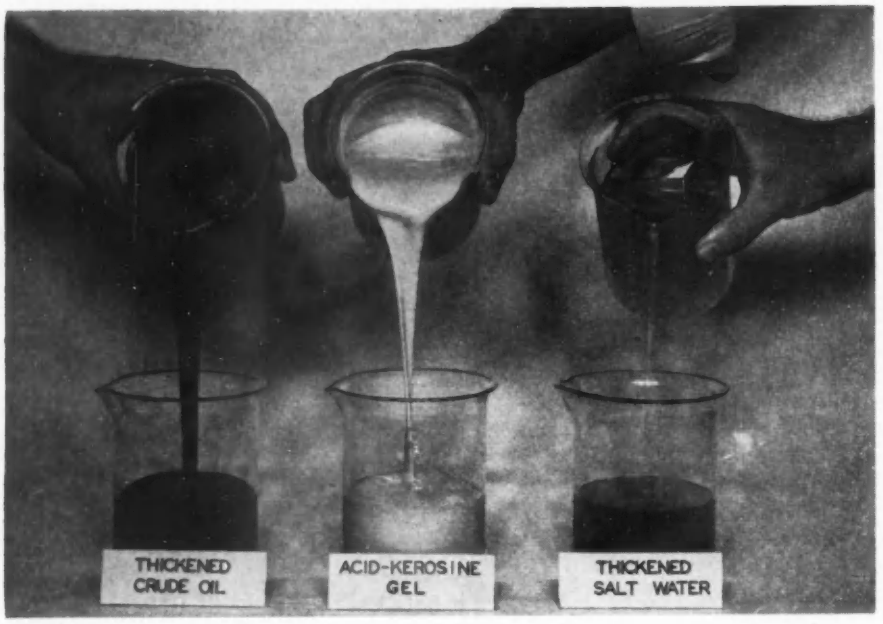


Fig. 3—Types of fluids used as sand carriers are: thickened crude oil, acid-kerosine gels for high temperatures and a new innovation, thickened salt water.

that the tubing is free of paraffin or scale.

The first step in the treatment is to obtain injection rate data by injecting well fluid (salt water or oil) into the formation. The thickened gel is then prepared and the desired amount of graded sand is added. The sand is mixed thoroughly with the gel in a large truck-mounted paddle tank. The paddle mixer distributes the sand evenly in the liquid, so that the desired amount of sand may be injected into the formation with a minimum risk of screening out. As soon as it has been thoroughly blended, the sand-laden fluid is pumped into the formation.

The casual observer may think this method is similar to other pressure placement methods. However, due to the larger amounts of sand being placed by the viscous fluid, the apparent permeability is greatly increased which, in turn, reduces the stress on the formation caused by a high producing pressure differential. Several wells treated in this fashion, without running screens or liners, have produced for appreciable lengths of time without sanding up.

TABLE 1

Sand Sizes—Sieve Number and Corresponding Particle Size

Sieve No.	Inches	REMARKS
10	0.079	
12	0.066	
14	0.0557	Large size sand used in sand control treatments.
16	0.0468	
18	0.0394	
20	0.0331	
25	0.0278	
30	0.0234	Small size sand used in sand control treatments.
35	0.0197	
40	0.0166	

Pertinent factors. A number of questions should be considered when a treatment is contemplated:

1. Is a retainer type packer necessary?

Use of a packer depends upon the anticipated condition of the casing. Field or service men in the area can usually advise what pressures may be expected in a particular area.[4]

2. What fluids are used to kill wells?

Oil or salt water is generally used to kill wells. The use of drilling mud complicates the operation substantially, since it has been found that mudding up formations at the conclusion of the treatment often reduces the productivity of the well.

3. Can the screen be run on the tubing while the sand placing treatment is being performed?

Yes, although the usual practice is to perform the treatment, pull the tubing, pick up the screen, rerun the tubing, and then set the screen. Wash pipe, liner and shoe assembly can be run prior to injecting sand, and after the sand has been squeezed, the screen can be washed into place. The sand-laden fluid is pumped down the tubing through the wash pipe. Flapper-type back pressure valves which are held open by the wash pipe are recommended.

4. Should liner packer or blank liner be run above screen?

Both types of equipment have been used with success, but one has no apparent advantage over the other. Many successful completions have been made where no sand was placed around the screen. One mechanical advantage of setting the liner packer and screen with no sand in the annulus between screen and casing is that a larger diameter screen may be used.

5. Is a screen necessary?

Yes. Screens and slotted liners are recommended, although there have been a few successful treatments per-

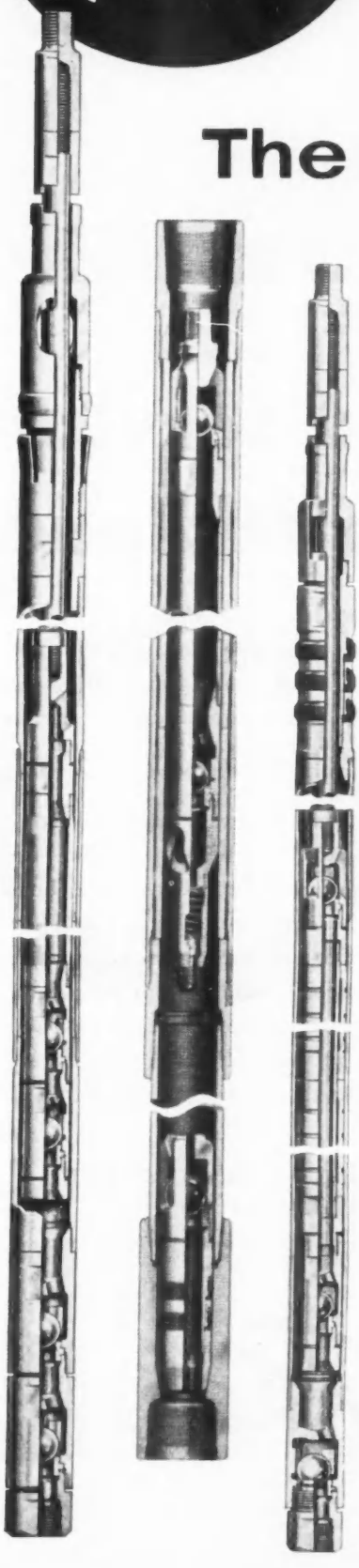
TABLE 2

Results of Sand Control Treatments in Texas Gulf Coast

COUNTY	Formation	Pounds of Sand Used	Gallons of Fluid Used	PRODUCTION	
				Before	After
Chambers	Miocene	16,500	6,000	Completion, New Well	50 BOPD, Flowing, No Sand
Duval	Argo Sand	6,000	2,000	8 BOPD, Gas Lift, Sanded Up	40 BOPD, Gas Lift, No Sand
Duval	Argo Sand	6,400	2,500	Off Production	50 BOPD, No Sand
Hardin	Oligocene Stringer	1,500	1,000	Show Oil, No Water	19 BOPD, No Sand
Harris	Miocene	4,500	2,000	10 BOPD, Pumping, Sand Trouble	25 to 28 BOPD, No Sand
Harris		10,000	3,000	None, Sanded Up	200 BOPD Pot., 90 BOPD Allowable, No Sand
Harris	Miocene	6,000	2,000	None, Sand Trouble	104 BOPD, Pumping, No Sand
Harris		8,000	5,000	None, Sanded Up	36 BOPD, Pumping, No Sand
Jefferson	Miocene	6,000	3,000	11 BOPD, Sand Trouble	11 BOPD, No Sand
Jefferson		4,000	2,000	Sanded Up	85 BOPD & Water, No Sand
Jefferson	Frio	10,000	5,100	Sanded Up	10 BOPD, No Sand
Jefferson	Marg. No. 3	5,250	3,000	Sanded Up	27.7 BOPD, Flowing, No Sand
Jefferson	Frio	9,000	3,000	Sanded Up	65 BOPD, Pumping, No Sand
Jefferson	Miocene	10,100	3,000	Sanded Up	123 BOPD, Flowing, No Sand
Jefferson	Miocene	10,100	3,360	Completion, New Well	60 BOPD, No Sand
Jefferson	Miocene	19,000	6,000	Show, Sanded Up	77 BOPD, Trace Water, No Sand
Jefferson	Miocene	10,500	3,000	Sanded Up	272 BOPD, 117 BWPD, No Sand
Jefferson	Miocene	12,400	3,000	Sanded Up	50 BOPD, 120 PWBD, No Sand
Liberty	Yegua	1,750	2,000	4 BOPD, Sand Trouble	25 BOPD, No Sand
Matagorda	Frio	2,500	2,000	20 BOPD, Sand Trouble	41 BOPD, No Sand
Victoria	Greta	21,000	6,000	Sanded Up	48 BOPD, No Sand
Victoria	Greta	5,000	2,500	Sanded Up	130 BWPD, No Oil, No Sand
Victoria	Greta	10,000	3,000	Sanded Up	Unsuccessful, Making Sand
Wharton	Frio	1,500	1,000	Sanded Up	75 BOPD, No Sand
Wharton	Greta	6,000	2,000	Sanded Up	27 BOPD, No Sand
Wharton	Frio	12,000	4,000	Unknown	40 BOPD, No Sand

They're Ready!

The New Bethlehem *Beeline* Subsurface Pumps



Here's important news for production men: Bethlehem Supply now offers a brand-new, up-to-the-minute line of subsurface pumps, marketed under the trade name *Beeline*.

As you'd expect, Beeline pumps are built to the same high standards that characterize all Bethlehem products. Components are made to extremely close tolerances; rigid controls assure precision, long life, and complete conformity to API requirements.

You can obtain these sectional-liner pumps, rod full-barrel pumps, and three-tube pumps with many combinations of fittings and optional equipment. The proper Beeline unit can be furnished for any well condition. Regardless of your problem, there is a pump that will exactly meet your needs.

And here's another point — a big one. In major production areas of the oil country, Bethlehem maintains fully-staffed service shops, where mechanical work is handled by expert pump men. There you're assured of a first-class job. Complete assortments of parts are always on hand, and the service is *fast*.

Now that the Beeline pumps are available in every major field, it is possible to "go Bethlehem" all the way . . . from the surface to the bottom of the hole. There is no better combination than Bethlehem beam pumpers, sucker rods, and subsurface pumps. Call us for definite recommendations.

BETHLEHEM SUPPLY COMPANY

General Offices:
21 E. Second St., Tulsa, Okla.

West Coast Headquarters:
Los Angeles, Calif.

Export Distributor:
Bethlehem Steel Export Corporation
25 Broadway, New York, N. Y.

Three of the several types of Bethlehem Beeline Pumps.

The Phillips P4 well in the TXL Field near Midland, Texas, is producing 16 bbl of oil daily, from corrosive Devonian formation.

View of the P4 well-head equipment. Bethlehem "46" rods have been used in this well since mid-1949, without failure.

"46" Rods Give Good Service in 7800-ft Well Near Midland

More than five years of trouble-free pumping have been provided by Bethlehem Sucker Rods in the 7800-ft TXL P-4 well operated by Phillips Petroleum Company, near Midland, Texas.

Camera catches Jake Barbee, maintenance superintendent for Phillips Petroleum, making an office call.

This well has a string consisting of 1550 ft of 1-in., 1850 ft of ⅞-in., and 4400 ft of ¾-in. Bethlehem "46" rods (nickel-molybdenum). The well averages 16 bbl of oil daily. No water has been encountered.

Oil-field operators can always count on economy and dependability when they make up strings with Bethlehem Sucker Rods. Bethlehem rods are made of carbon and alloy steels. They are fully normalized, and come in five types, each designed for a specific kind of pumping duty. For detailed information about Bethlehem rods and accessories, get in touch with the nearest Bethlehem office or sucker rod distributor.

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

BETHLEHEM *Sucker Rods*

BETHLEHEM STEEL

formed with no screens placed in the well. It is possible that some wells completed in sands of low permeability can be treated early in the producing history of the well without setting screens, because the increase in drainage area would reduce the tendency of the well to "sand-up." The combination of the screen, the coarse supporting sand and the establishment of lenses of coarse sand are the explanations for the success of this technique.

6. Is it necessary to obtain a rise in injection pressure during the treatment?

A minority of these treatments have been performed without experiencing a rise in pressure above the normal injection pressure. These treatments are apparently as successful as those upon which a pressure rise was obtained.

General advantages of this technique are:

1. Reduced time required to perform the operation.
2. The amount of salt water entering the formation may be greatly reduced or entirely eliminated, particularly where oil-base fluids are used as carriers for the coarse sand.
3. Where gelled oil is used, the treatment of low pressure wells may be made without losing water into the formation. This may be important, as some formations having low reservoir pressures cannot be exposed to water without causing serious reduction in permeability.
4. Fluids which are efficient carriers permit injection of large amounts of coarse sand into the formation in a short time.
5. Costs are low.
6. Treatments of this type have resulted in successful control of formation sand in approximately 85 percent of the applications.
7. Clean up time is materially reduced due to the small amounts of treating fluids used in this process.

REFERENCES

[1] R. H. Smith & A. C. Polk, Jr. "Use of Plastics in Consolidating Loose Sands in Wells," A.I.M.E. (T.P. 2147) Pet. Tech., March, 1947.

[2] P. H. Cardwell, "Plastic Used to Consolidate Incompetent Formations," A.I.M.E. (T.P. 2148) Pet. Tech., March, 1947.

[3] Harold E. Staadt, Jr., "Sand, Important Factor in Successful Fracturing"—The Petroleum Engineer, December, 1953.

[4] C. J. Rodgers, "Practical Aspects of Gravel Packing," A.I.M.E. (T.P. 3741) Pet. Tech., October, 1953.

—The End

Meet the Widest Range of flow measurement requirements with AMERICAN-WESTCOTT A-88 ORIFICE METERS

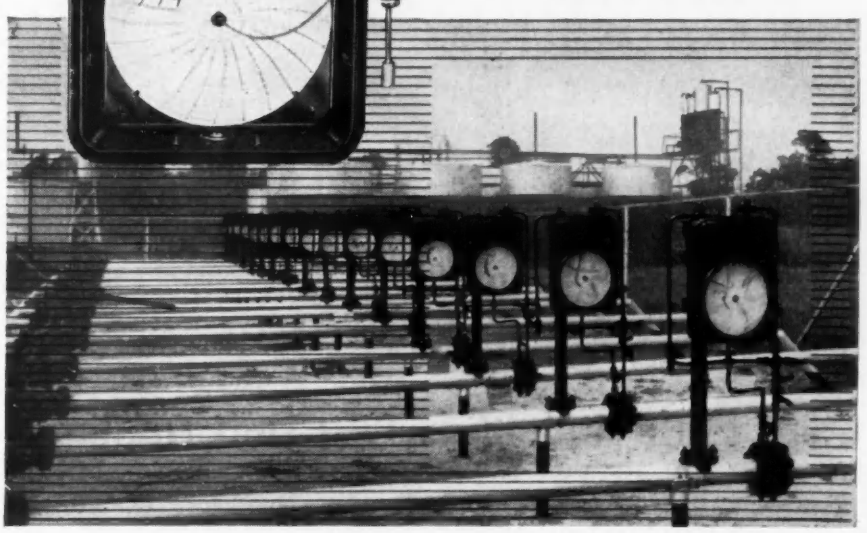
RECORDING · INDICATING INTEGRATING · TELEMETERING

American A-88 standard mercury type orifice meters for working pressures to 5000 psi. in interchangeable 10,20,50,100 and 200-inch ranges give you complete versatility to meet any flow measurement requirement. Integrating instruments integrate both static and differential pressures giving totalized flow indications and telemetering equipped instruments transmit integrated indications to remote locations.

Recording Meters may be equipped with standard O-150°F. Temperature Elements, as illustrated, giving you every advantage of better temperature measurement with speed, accuracy, simple installation, economy and freedom from maintenance.

Wherever accurate recording and precision measurement are wanted...at high or low flow rates . . . at varying temperatures . . . there's a job for American® Series A-88 Orifice Meters.

Write for full details now.



AMERICAN-WESTCOTT MERCURY MANOMETERS GIVE YOU ALL THESE ADVANCED DESIGN FEATURES . . . . . .

- Minimum Simple Maintenance—easy access to float lever arm during calibration.
- Highest Accuracy—inherent straight line calibration.
- Interchangeable Ranges—no manifold piping changes.
- Pressure-Tight Teflon-Packed Stuffing Box—nearly frictionless, free from maintenance troubles, never needs lubrication.
- Teflon-Packed Pulsation Dampener—externally adjustable under full line pressure without leakage.
- Dependable Performance—improved check valves give positive shut-off for over-range protection.

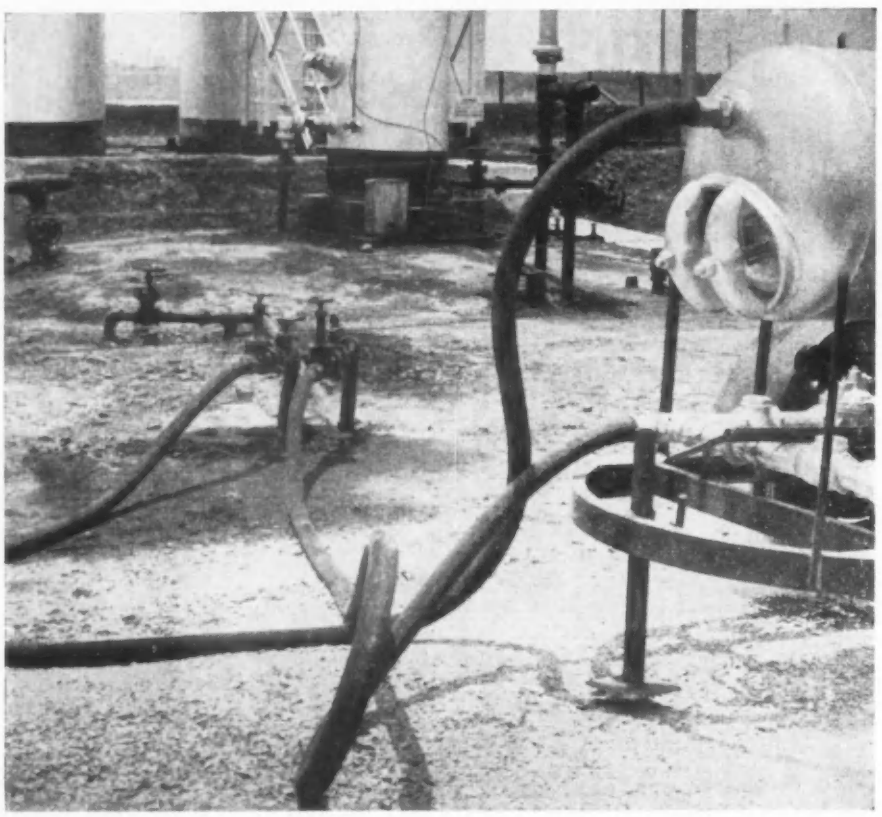
AMERICAN® METER COMPANY

GENERAL SALES OFFICE: 1513 Race Street, Philadelphia
Albany • Alhambra • Atlanta • Baltimore • Birmingham
Boston • Chicago • Dallas • Denver • Erie • Houston
Kansas City • Los Angeles • Minneapolis • New York
Omaha • Pittsburgh • San Francisco • Seattle • Tulsa
IN CANADA: Canadian Meter Company, Limited, Hamilton
Edmonton • Calgary

How to do it

PRODUCTION HINTS

$10 is paid for each illustrated acceptable contribution. Mail to The Editor, WORLD OIL, P. O. Box 2608, Houston 1, Texas.



Color Code Simplifies Test Unit Hookup

Standardized colors for inlet and outlet connections from tank batteries to well testing units simplify the hookup and insure that the connection is right.

In the background of this illustration are two gate valves connected to short risers coming out of the ground. The valve at left is painted green and is tied into the test header on the flow line manifold at the tank battery. The other valve at right connects to the header which carries fluids to the gun barrel or to a test tank. This second valve is painted red and connects to the discharge line of the portable well testing unit.

With such color codes used on all batteries, the engineer or pumper who makes the well test need not have to trace out lines every time a different well is tested on a different battery. When the inlet always connects to the green valve and the outlet to the red valve, the well test unit is always hooked up correctly at any tank battery.

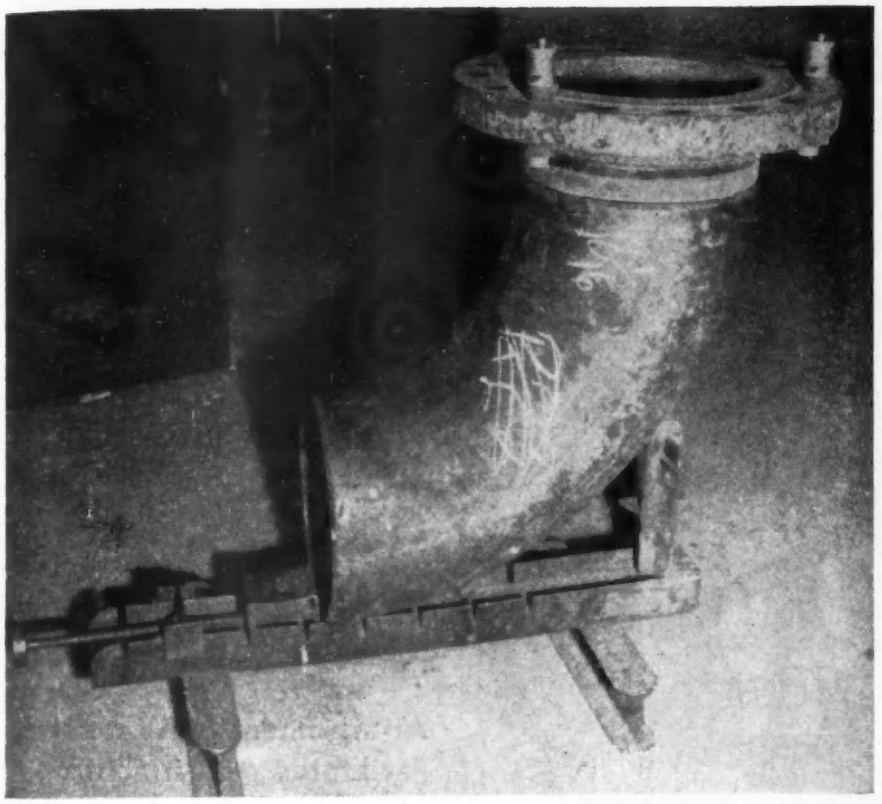
Heavy Pipe Used for Base Of Portable Pumping Unit

When shallow wells are being drilled in almost depleted fields, the problem of erecting and tearing down the pump jacks exists. When these are bolted to a base of timbers the jack must be removed from the timbers and then moved to another location.

One company recently solved this problem by using a heavy skid fabricated of two-inch heavy wall pipe. A small pump jack is attached to this by means of heavy bolts which are run through the pipe and then through the angle iron at the base of the jack.

When ready to move to location, it is winched up on a bobtail truck and carried directly to the well. The only connections to be made after the jack is placed is the installation of the electric motor and the attachment of the polish rod to the head of the jack.

If the time arises that the well has to be pulled, the portable jack and its base can be moved back out of the way of the pulling machine and adequate room will be available for crews working the well over. When it is needed at another location, it can be quickly dismantled as mentioned before and moved by truck to the next well.



Stand Makes Fitting Flanges Easy

A fabrication stand that will hold various types of bends while flanges are being fitted is illustrated. The stand is made of a length of channel iron notched at regular intervals along each side. The notches accommodate a clamping device for holding the fabrication firmly in place. The channel iron may be welded to a pipe, channel iron, iron bar or other sturdy base.

Mount Air Tongs on Volume Tank for Moves

The use of air-powered tubing tongs saves back-straining pipe make-up and break-out and considerable time as well, but, the air tongs are expensive and unless properly kept, they might not operate properly. In the oil fields, transportation takes a big toll in wearing out equipment fast. And, so it is with such items as air-powered tongs unless adequate care is taken.

Here is a unique idea that has paid dividends in the form of well-kept air tongs for this roustabout crew. This set of tongs is carried on a special mounting frame welded to the top of

PUMPING PROBLEM

REDA

MAY HAVE THE *RIGHT* ANSWER

. . . from ⅓ HP to 240 HP . . . from 20 bbls to 17,000 bbls . . . from 200′ to 10,000′ and more . . . Yes, a REDA may do that pumping job BETTER . . .

Reda Pumps are accepted as original equipment, or replacement equipment, because they produce at a lower cost per barrel of fluid. Whether it's large volumes from shallow depths, or modest volumes from great depths, Reda Pumps provide operating savings.

IMPROVED DESIGN:

Constant research and design improvement are responsible for lengthened operating life; corrosion resistance, low labor cost per barrel of fluid produced.

IMPROVED EFFICIENCY:

Greatly improved overall efficiencies have improved Reda performance as much as 25%; a substantial operating saving.

If you have a pumping problem, our engineering staff is always ready to assist you. Phone or write:

REDA

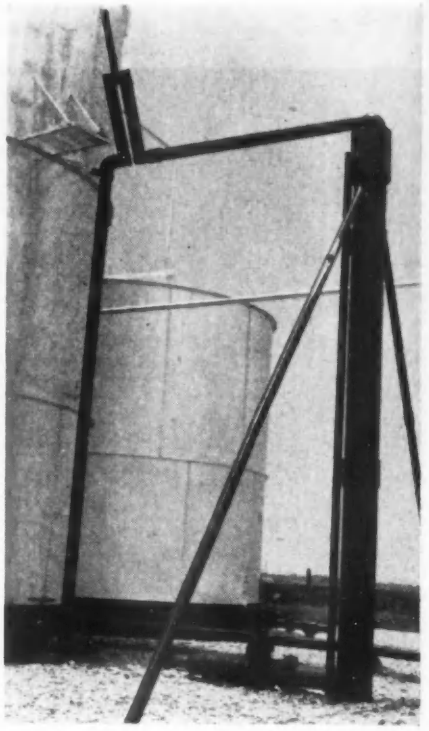
PUMP COMPANY

■

BARTLESVILLE, OKLAHOMA

the air volume tank of the compressor unit which supplies the air for the tongs. The compressor unit is trailer-mounted, and is powered by a small gasoline engine. The large volume tank makes available the required quantities of air when running in tubing.

There are two parts to the rack: the front bracket and the rear supporting leg. The latter is a "Y" brace welded to the tank, with the handle of the tongs resting in the saddle of the "Y." The front part of the rack is made of two pieces of plate steel that span the widest portion of the tongs. A hand screw hold-down secures the tongs in position for moving over roads. This hold-down is a short section of channel iron that spans the tongs and contains a hand bolt in the center which screws into a nut welded to the supporting rack below. Air hoses are coiled on racks welded to the air tank as shown, making the unit complete within itself.



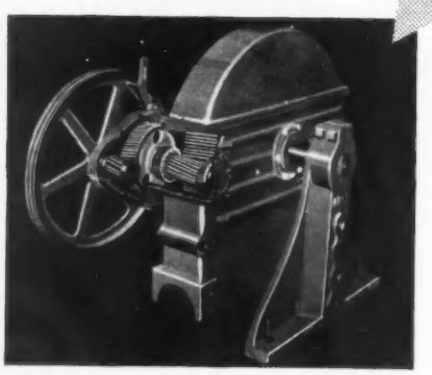
Arrangement of Water Leg Facilitates Adjustment

A novel arrangement of the conventional water leg of a gun barrel tank enables the pumper to make desired adjustments without a helper. The water leg, an inverted U-section in the overflow line connects to the bottom of the tank. Top of the inverted U-section governs the salt water level in the gun barrel tank.

Instead of supporting this inverted U-section with a stiff leg as is conventional practice, the adjustable section is held in position by a tight fit in the collar connection into the horizontal drain line. The pumper adjusts the U-section to the desired height by climbing down a ladder attached to the side of the tank. A small platform supported by the tank provides a working platform. Top of the U-section is equipped with an extended breather pipe which prevents "gas-lock" in the line.

Salt water flowing from the drain line flows into an open ended section of vertical casing. The casing is supported by angle braces on either side as shown and equipped with an overflow drain. The enlarged pipe plus the open end allows the water to flow more rapidly than a smaller closed line. The water drains into a salt water sump where it is picked up and pumped into disposal wells.

THE Inside STORY . . .



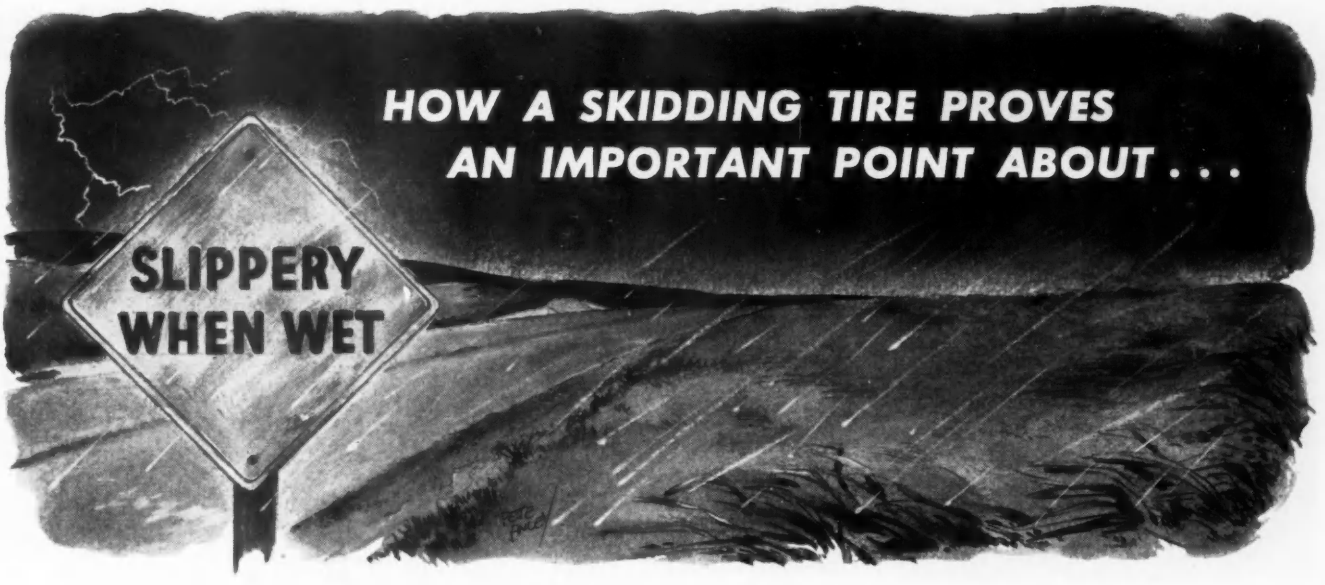
JENSEN's DOUBLE GEAR REDUCTION

Skillful engineering gives JENSEN Units amazing economy and durability. The double gear reduction, for example, is designed with the second stage main gear of large diameter, reducing tooth pressure and affording flexibility of gear ratios found only in JENSEN Units. You can change from double to single or from single to double quickly and easily. Write for complete details . . . or see your JENSEN Dealer.

JENSEN PUMPING UNITS

JENSEN BROS. MFG. CO., INC.
Coffeyville, Kansas, U.S.A.

EXPORT OFFICE:
50 CHURCH ST., NEW YORK CITY



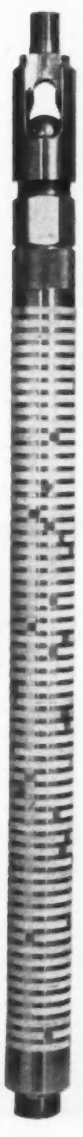
MARTIN PLUNGERS

You have a well with a high water content. Pumping that well is a worrisome, expensive headache. Those plungers you've been using just will not hold up. Expensive pulling jobs and repairs eat into your profits. Finally you start looking for an answer to the problem. And you find it . . .

You discover Martin Plungers

Why do Martin Plungers work so successfully in high water content wells when other plungers fail? . . . The answer is as simple as a skidding tire.

Water is a lubricant for rubber. And, since the Martin Plunger uses numerous split rubber and duck rings, the water content of the well actually serves as an efficient lubricant for the Martin Plunger. Where other plungers fail, the Martin Plunger goes on producing month after month.



The moment you start using Martin Plungers, your operating expense begins to drop. Pulling the pump for repairs becomes an exception rather than the rule. And, should it become necessary to repair your Martin Plunger, it may be repaired for ⅓ to ¼ the cost of a new plunger. Only the special split rubber and duck rings are replaced.

Your Martin Plunger also increases working barrel life—you will save up to 80% on barrel or tube cost due to the slow rate of wear. Yes, you discover Martin Plungers, and you discover real dependability and economy. See it at your supply store today.

JOHN N. MARTIN
Manufacturer
9 W. BRADY STREET • TULSA, OKLA.

For Rights-of-Way Maintenance

Why spend money hand-grubbing oil and gas line rights-of-way when you can do the job better, cheaper, quicker with a Caldwell S-2 Rotary Brush Cutter? The S-2's 57-inch reversible Spring Steel Blade will cut brush to two inches thick, and better, and will do it in a once-over. Users include Transcontinental, Texas Illinois Transmission, Tennessee Transmissions, others. We'll give you a demonstration. Write Dept. W.

E. L. CALDWELL & SONS
CORPUS CHRISTI, TEXAS

WE CAN SAVE YOU MONEY on Your Flood Water Problems!

As pioneers in the treatment of flood water in the Mid-Continent Area since 1938, our trained staff of water engineers, chemists and bacteriologists are familiar with your every day flood water problems.

Contact us for an analysis of your problem.

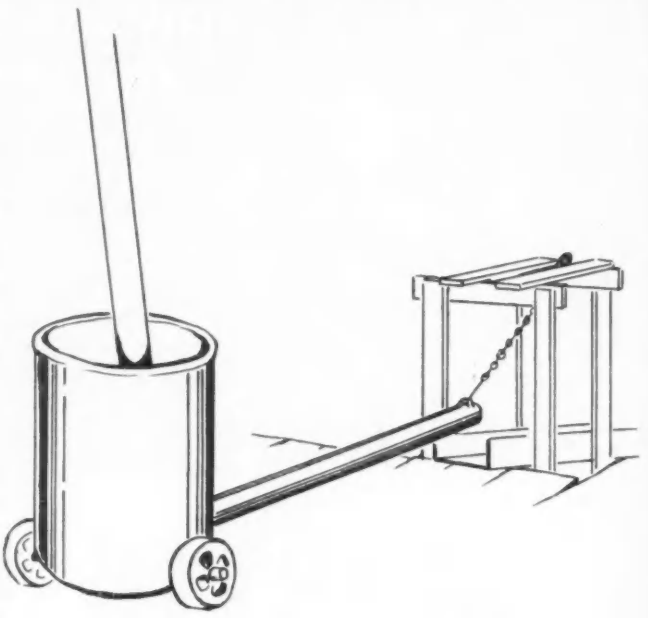
Consultants to the leading major companies and independent operators with Secondary Recovery Operations.

TREAT-RITE CHEMICAL COMPANY

Nowata, Oklahoma
Phone 65

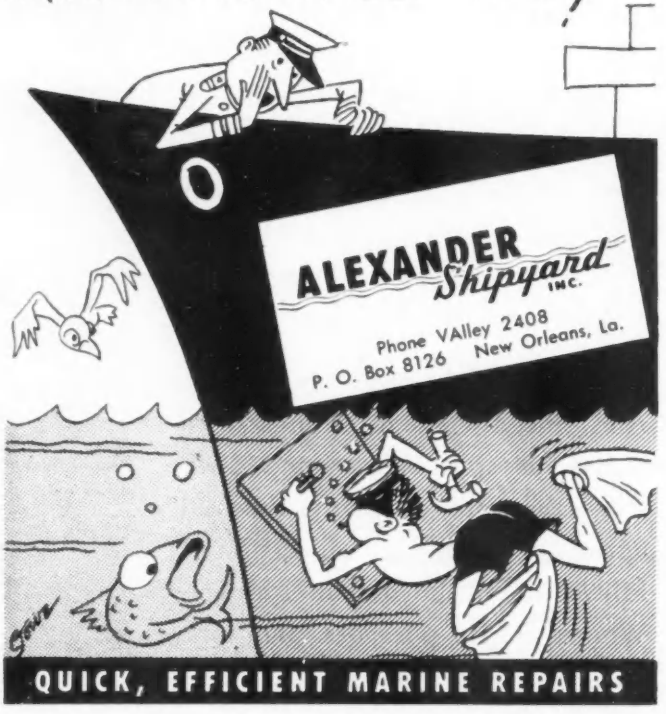
Monahans, Texas
Phone 486

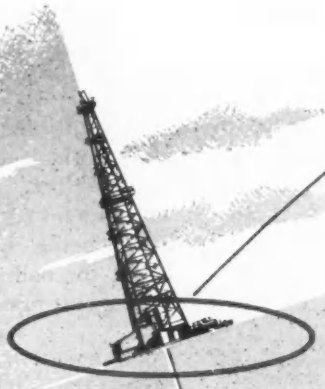
Mounted Bailer Dump Box Is Easily Moved



A labor-saving device on a cable tool rig is this bailer dump box which features wheels for easy and quick moving. The bailer dump box is found in many forms from rig to rig and serves to carry the contents of the bailer into a slush pit. On most rigs, it is permanently located at the edge of the derrick floor, requiring that the floor man push the bailer far to one side so that it can be lowered into the bailer dump box.

The utility and efficiency of such a bailer dump box can be substantially increased by mounting it on wheels as shown. Welding an axle across the bottom of the body and attach the wheels. The discharge pipe must be suspended from a wooden frame so that the entire unit can be moved. This discharge piping is per-


YOUR LOYALTY IS COMMENDABLE, DIGBY, BUT ALEXANDER SHIPYARD IS MUCH BETTER EQUIPPED TO HANDLE THIS!
ALEXANDER Shipyard INC.
Phone VAlley 2408
P. O. Box 8126 New Orleans, La.
QUICK, EFFICIENT MARINE REPAIRS



Sargent

has taken the long stroke unit from the TOP of the hole and placed it at the BOTTOM—

to operate hydraulically the time proved standard bottom hole pump!

Rod Problems and Tubing Wear eliminated

The Pump Unit can be surfaced by turning a valve

Reduces Plunger Bumping Up and Down

High Compression Ratio! This results from correct spacing of the traveling and standing valves, and the long pump stroke. It minimizes gas lock trouble in the production pump, and since the spacing is taken care of when the pump and unit are assembled in the shops, no guess work is necessary during installation or operation.

Simple isn't it?

"GOOD WILL" is the disposition of the pleased customer to return to the place where he has been well treated.
—U.S. SUPREME COURT

Write for details!

Standard of Excellence — *Since 1920*

CAN BE SERVICED IN ANY OF THESE FIELD STORES

CALIFORNIA
Long Beach
Bakersfield
Santa Maria
Ventura
Taft
Huntington Park

OKLAHOMA
Oklahoma City
Pawhuska
Seminole
Tulsa

TEXAS
Odessa
Snyder
Houston
Sundown
Wichita Falls
Quitman

NEW MEXICO
Hobbs

KANSAS
Chase
Russell

ILLINOIS
Grayville

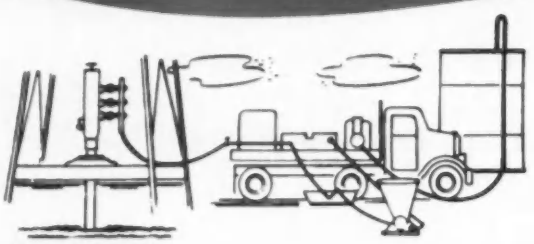
ARKANSAS
Magnolia

COLORADO
Rangely

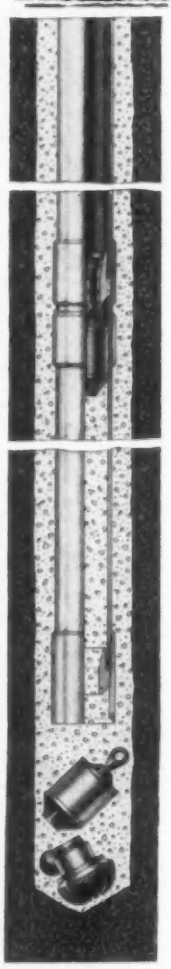
Sargent

ENGINEERING CORPORATION
MAIN OFFICE AND PLANT
2533 E. FIFTY SIXTH ST
HUNTINGTON PARK, CALIF

RECTOR FULBORE METHOD assures a BETTER Cementing job . . .



and Here's Why!



Simplest of all two-plug methods, the Rector Fulbore Method also has these 5 basic principles which are absolutely essential for better cementing jobs.

1. Complete and positive segregation of cement between the two tight-fitting plugs.
2. Closed circuit. Cementing head is assembled before making-up on casing string. It's never opened during operations . . . air pockets can't form in mud or cement column.
3. Full Casing Discharge. Ejection of float assembly from shoe provides unrestricted opening, reduces load on pumps, permits greater discharge volume.
4. Positive Flow-Back Control is assured when top plug latches in stall collar.
5. Wiping action on casing is provided by lips on both plugs.

It will pay you to get complete information about the Rector Fulbore Method of cementing before your next cementing job . . . also about our new Two-Plug Stage cementer for your next stage job.

RECTOR WELL EQUIPMENT COMPANY INC

MAKING THE OIL INDUSTRY SAFER

1100 NORTH COMMERCE ST. FORT WORTH, TEXAS

Houston Plant: 2215 Commerce St.

REPRESENTATIVES IN ALL ACTIVE FIELDS

RECTORHEAD RECTOR FULBORE METHOD RECTORSEAL

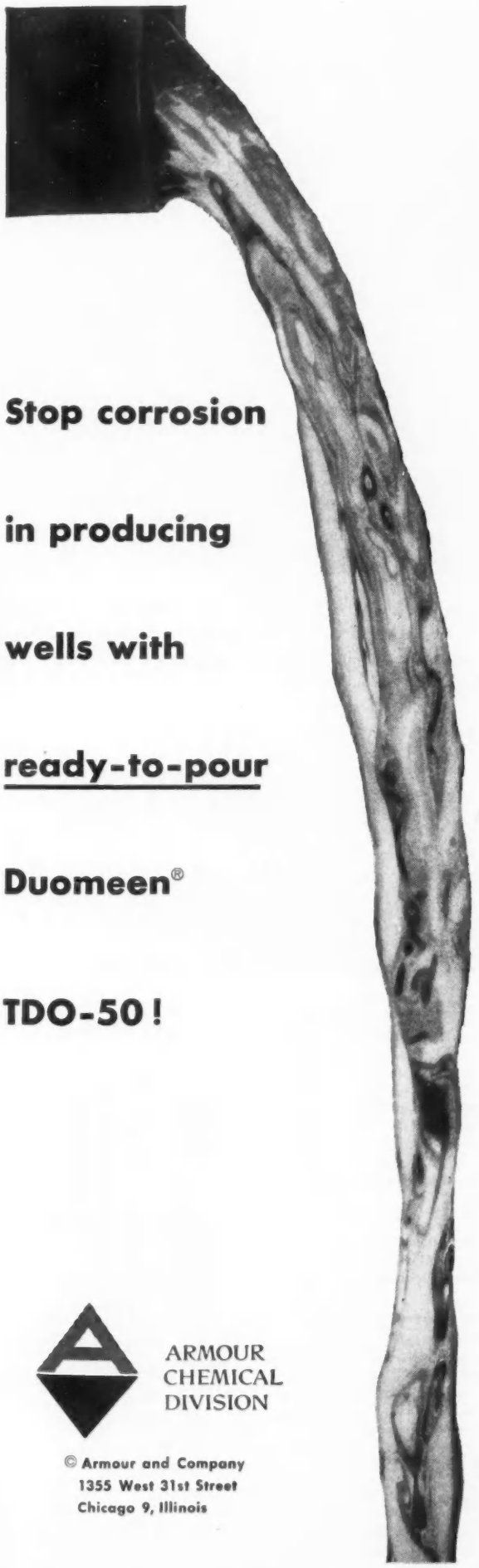
manently fixed to the dump box body. A chute built below the wooden frame carries the cuttings into the shale pit. When not in use, the moveable dump box is pushed out of the way. By locating the wheel-mounted unit near the derrick floor opening, little effort is required to spot the bailer into the box when dumping cuttings.

Fan Is Simple to Make Using Discarded Material

Although winter is approaching, many a roustabout crew well remembers those hot days spent working in unshaded areas in close quarters. When cold and wet weather restricts outside work, some time could be spent in planning for the coming summer. Herewith a simple project is illustrated which could be undertaken when crews must work indoors. It is a simple device that can be made in the field shop. Parts required are an old discarded gasoline engine, an attic fan blade, and some angle iron.

A gasoline-driven engine from an old pump was salvaged and serviced. This three-horsepower engine was then mounted on a stand built from angle iron and one-inch pipe. The legs were screwed into collars welded to each corner of the framework thus making it more portable when the time came to move it to a new location.

A 36-inch attic fan blade was fastened directly to the drive shaft of the motor by means of a key-way and



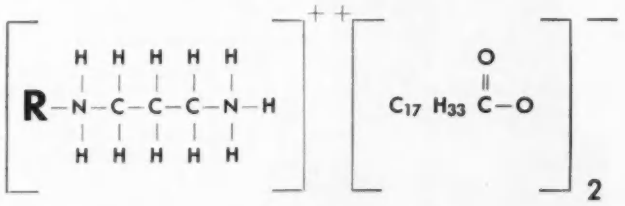
Stop corrosion in producing wells with ready-to-pour Duomeen® TDO-50!

No mixing! Just pour this low-cost Armour chemical down the hole—protects sucker rods, pumps, tubing!

Duomeen TDO-50 is our potent new corrosion inhibitor supplied as a 50% active solution. This cationic surface active agent is already mixed with a petroleum diluent to save you the trouble of blending in the field. It's ready to pour at even −10°F., ready to convert steel surfaces from water-wettable to oil wettable, thus forming a protective coating against corrosion.

Regular Duomeen TDO, our *100%* active corrosion inhibitor, has found wide use because of its outstanding results in controlling acid conditions in sour wells using quantities as low as 1-4 pints per 100 barrels of produced oil! But, since some of our customers wanted a ready-to-use form of this effective chemical, we developed ready-to-pour Duomeen TDO-50. Now, both products are available in truckload and drum quantities, to help you stop corrosion all the way down to the bottom of the hole. Send the coupon for our free technical bulletin on corrosion, and free samples of Duomeen TDO and TDO-50 to test yourself!

Structural Formula for Duomeen TDO:



Mail This Coupon to Stop Corrosion Costs Now!

Armour Chemical Division
1355 W. 31st Street, Chicago 9, Ill.
Please send me:

- ☐ Sample of Duomeen TDO
- ☐ Sample of Duomeen TDO-50
- ☐ "Combat Corrosion" Booklet

Name _____

Title _____

Firm _____

Address _____

City _____ Zone ____ State _____

011

ARMOUR CHEMICAL DIVISION

© Armour and Company
1355 West 31st Street
Chicago 9, Illinois

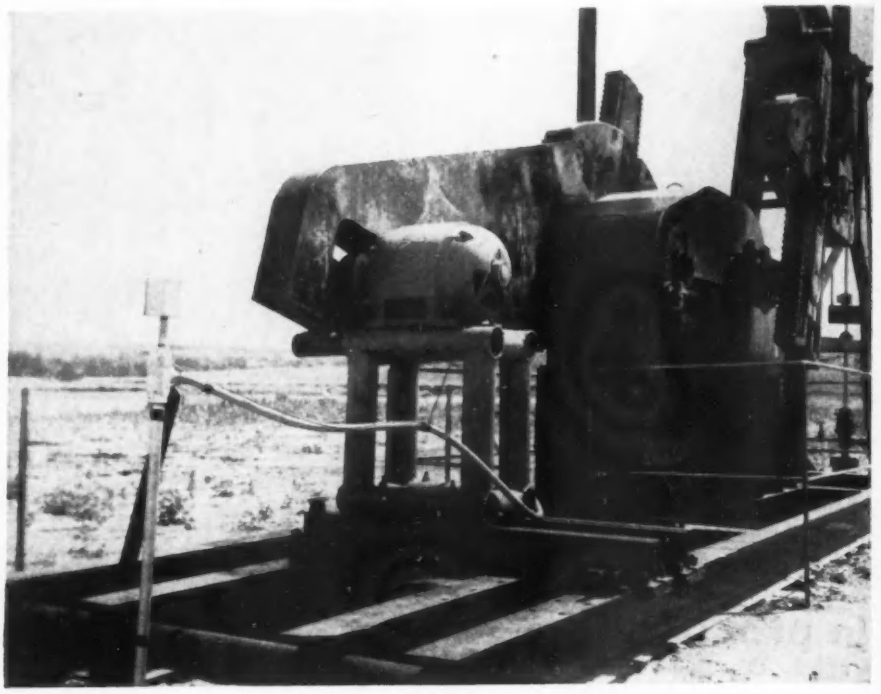
lock screw. Where the shaft protruded through the fan bushing, a small plate was welded onto the shaft as a safety measure, thus insuring that should the setscrew become loose, the blade would not fly off to injure anyone.

A guard for the blade was fashioned from angle iron and a heavy grade of hardware cloth.

Raise Pumping Unit Motor To Escape Water Damage

Sudden rain storms that filled a shallow creek bed with a couple of feet of water caused one Kansas operator to elevate the pumping unit motor as shown. The gear box on the unit was elevated sufficiently because of the necessity of allowing clearance for the counterweight crank arm. However, the electric motor, when originally installed on the unit foundation, was near ground level, making it vulnerable for one or two feet of water.

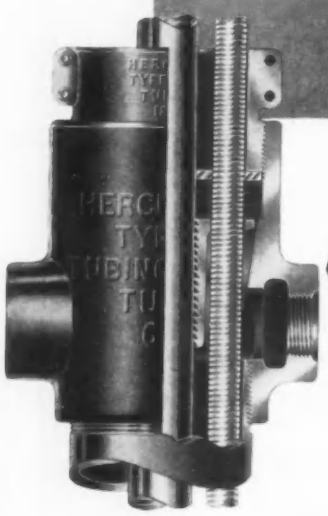
A sturdy framework of three-inch pipe was welded in the form of a box as illustrated. This frame was heavily bolted to the same anchor bolts provided on the adjustable foundation which is part of the unit foundation. This adjustable feature permits the pumper to make slight changes in the distance from the motor to the unit so that the vee belts may be tightened. The motor was then bolted to the top of this pipe framework, and the alteration job was completed. The old vee belt guard was used as before.



IN MEDIUM DEPTH WELLS

HERCULES "TYPE J-5-R" AND "RC" TUBING HEADS

DESIGNED FOR USE WITH REDA PUMPS



Designed for medium depth wells. Will suspend 5000 feet of 2" or 2½" Tubing or a proportionate amount of 3". Available in casing sizes from 5½" OD (which will suspend 2" or 2½" tubing only) to 7" OD which will suspend 2", 2½" or 3" tubing. Pressure cast steel body hydrostatically tested to over 4000 psi. 2" LP outlets furnished. (3" optional). Approximate over-all height, 14½".

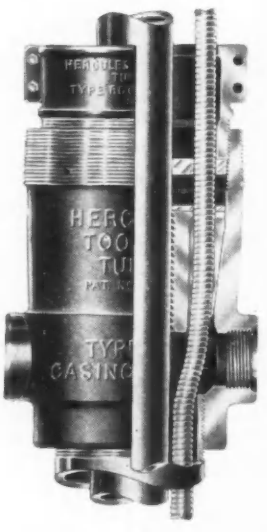
Both heads feature the positive aligning hinged slips (which allow the electric cable to pass through the slips close to the tubing) and the overhead packing arrangement which packs off the tubing and electric cable simultaneously. The packing arrangement in both heads is tested to 2000 psi.

"TYPE J-5-R" TUBING HEAD

SOLD AT ALL SUPPLY STORES

Built to support the weight of 10,000 feet of 2", 2½" or 3" Tubing, 5,000 feet of 4", or 4,500 feet of 5½" Casing. Available in casing sizes from 6⅝" to 9⅝" OD. 3" side outlets furnished. Pressure cast steel body tested to 4000 psi. Approximate over-all height, 23".

IN DEEP WELLS



HERCULES TOOL COMPANY

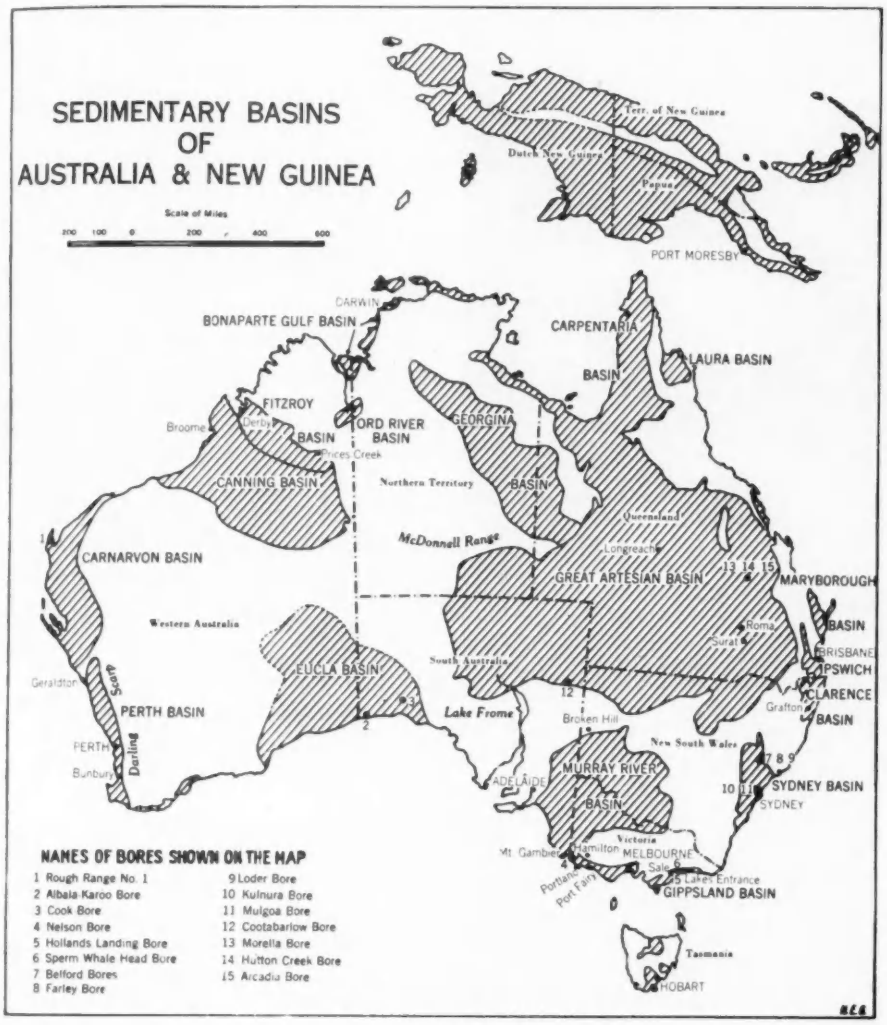
SINCE 1924

Manufacturers of Oil Field Equipment

GENERAL OFFICES AND PLANT • TULSA, OKLAHOMA

Export Representative Oil Field Equipment Co., Inc. • 30 Church Street, New York, N. Y.

"TYPE RC" TUBING HEAD



WAPET To Spend $40 Million In Australian Oil Search

Rough, Cape and Grant ranges are targets of intensified exploration program which is spreading to Queensland.

By DON KLIEWER, WORLD OIL Staff

AN INTENSIFIED DRIVE to find productive oil fields in Western Australia has been announced by West Australian Petroleum Pty., Ltd., the company which struck a flow of 20 barrels of crude an hour in its discovery wildcat, Rough Range 1, at Exmouth Gulf last December.

WAPET's plans involve programs of geological, geophysical and drilling work in three main areas: Rough Range and Cape Range, in the Carnarvon Basin around Exmouth Gulf, and at Grant Range, in the Fitzroy Basin, inland from Derby on the far northwest coast of the continent.

The company is ready to spend $40 million before the end of 1956. This is more than double the total amount spent on oil exploration in Australia in the past 25 years and is twice what the major companies—Anglo-Iranian Oil Company and Standard Vacuum Oil Company—have spent in Papua in the past 15 years.

WAPET spokesmen said in September that during 1954 the company would spend more than $6 million in Western Australia. Discovery of more oil in commercial quantities would raise its expenditure to $16 million in 1955 and to about $14 million in 1956.

This development budget is based on the assumption that commercial oil fields will be developed at Rough Range and Cape Range from the strata which yielded crude at Rough Range last year. Deeper discoveries in either of these areas or success in other drilling efforts would substantially increase expenditures for drilling, transportation and other facilities.

More money would be spent in 1955 than in 1956 because in that year WAPET would complete its tooling-up for development, including installation of tankage, wharves and other facilities to transport oil in commercial quantities from any producing fields.

WAPET announced its budget estimates and plans after discussions were held at New York and Perth between principals of the American-Australian partnership.

Ampol Exploration Ltd., which owns 20 percent of WAPET, was represented in the New York talks by W. G. Walkley, managing director, and W. M. Leonard, general manager, the two top executives of its parent organization, Ampol Petroleum Ltd.

Subsequently, further talks were held at Perth by George M. Cunningham of American Overseas Petroleum Ltd., the exploration affiliate of California Texas Oil Company, Ltd.

The plan jointly agreed upon shows an optimistic outlook for future success. In two years, the company has achieved progress considering the conditions of operation in a barren, arid and almost uninhabited region.

Three rigs are drilling for the company at Exmouth Gulf, and another well was to be spudded in at Grant Range. Also, four geological and four geophysical teams are working in

A DRILLING SITE is being prepared in Shothole Canyon, Cape Range, near Exmouth Gulf, where West Australian Petroleum Pty. Ltd., owned 80 percent by California Texas Oil Company, has begun a drilling program.

parts of the company's 325,000 square miles of permit area running along the entire western coast of Australia.

Following success of Rough Range 1, further discoveries appear possible, although positive results are lacking. Well 1 has resumed drilling at 9900 feet after losing almost six weeks in fishing operations to recover a 10-foot length of tailpipe. The well will be drilled to rig limit in an effort to obtain sub-surface data.

After abandonment of Rough Range 2 as a dry hole, Well 3 was spudded in on another attempt to trace the oil horizon found at 3605 feet in the discovery wildcat. Its site was chosen by geologists working in New York and Western Australia after an exhaustive study had required a revised interpretation of geological conditions at Rough Range. At the end of September, Rough Range 3 had reached 3830 feet but had not penetrated the oil sand found in Well 1.

DR. HAROLD G. RAGGATT, secretary of the Federal department of National Development, is one of Australia's top geologists, and as a former director of the Federal Bureau of Mineral Resources, he directed the early surveys and mapping at Exmouth Gulf.

AL DYSART, drilling superintendent for Brown Drilling Company, Long Beach, Calif., which conducted drilling operations at Rough Range, Exmouth Gulf, Western Australia, for West Australian Petroleum Pty. Ltd. is optimistic over chances of discovering oil around Exmouth Gulf.

Twenty-five miles distant, at Shothole Canyon in Cape Range, WAPET's first hole met first with showings of gas and slight traces of oil, but then ran into salt water. It is being drilled ahead for geological information.

In the Fitzroy Basin, WAPET's third operational area inland from Derby and about 1500 miles north of Perth, preparations are being accelerated to get a drilling rig to the Grant Range site before the November monsoon renders the entire area impassable. Stores, camps, equipment, and personnel have been taken to Derby by charter vessel. Roads have been bulldozed into rugged uninhabited country, and spudding in was to have taken place late in October.

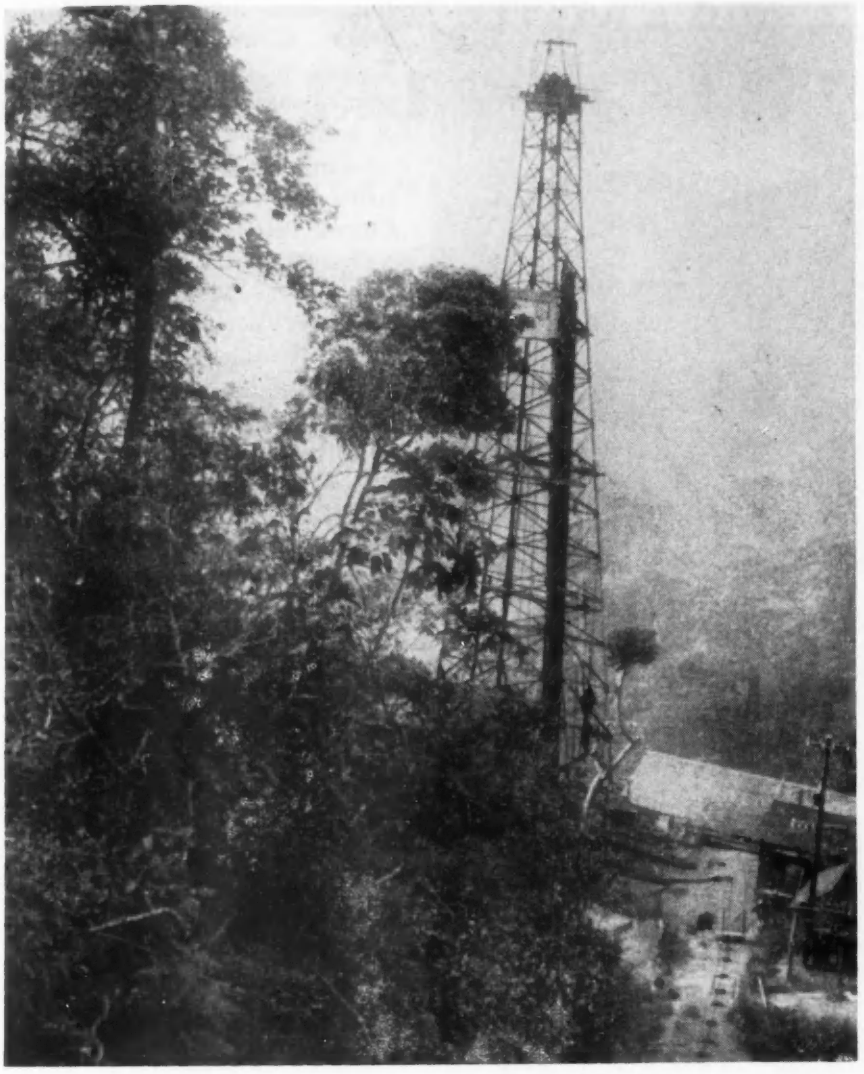
Hopes are high here, too. Small quantities of crude have been found in holes drilled over many years, and Devonian rocks in the area are highly fossiliferous, containing many reef structures such as are highly productive in West Texas and Canada.

Frank A. Morgan, who until recently was vice president of Richfield Oil Corporation and was 1952 president of the American Association of Petroleum Geologists, has joined the board of directors of Ampol Exploration Ltd. and will also act as its chief geologist and technical adviser. He is thus renewing an association with Australian exploration which began when he made the favorable report on the Exmouth Gulf area which led to the successful Caltex-Ampol drilling operation.

Since his recent arrival in Australia Morgan has voiced high hopes for the discovery of commercial oil fields on the western coast of the continent.

Elsewhere, too, there are signs of encouraging activity. In Queensland, 3000 miles east of Exmouth Gulf, two companies have found substantial gas flows. At Reid's Dome, near Springsure, about 250 miles inland from Rockhampton, Santa Fe Drilling Company, of California, drilling under contract for Australasian Oil Exploration Ltd. has brought under control a flow of 500,000 cubic feet of natural gas daily. A flow of 750,000 cubic feet daily has been encountered at Roma, 200 miles south of Reid's Dome by Associated Australian Oilfields, N. L.

—The End



Chinese Petroleum Corporation Photo

THIS DISCOVERY WELL at Chutauchi field is pumping 60 barrels daily of light crude and indicates a possible . . .

New Oil Structure In Southern Taiwan

Here's an expert's evaluation of what the future holds in this area.

By LEO W. STACH, Technical Consultant, Petroleum and Natural Gas, Tokyo

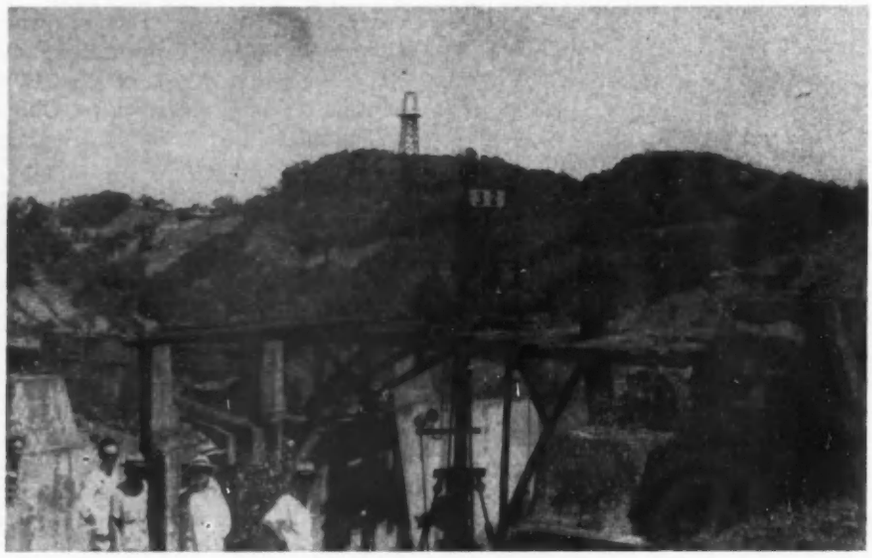
INITIAL PRODUCTION tests on an extension well drilled recently in southern Taiwan (Formosa) indicate the possibility of commercial production of oil from a narrow, steep, longitudinally faulted structure about 15½ miles long.

This first indication of success from an exploration program begun two years ago by the government-owned Chinese Petroleum Corporation, with the encouragement of the FOA Mutual Security Mission to China, will stimulate further exploration and development, and may aid considerably in reducing crude imports in the future. In recent years Taiwan's crude production has been only about 20,000 barrels annually. Production from the new discovery well has more than doubled the recent average daily production of crude in Taiwan.

Field reports say Chutauchi R-8, an extension well at Chutauchi field in southern Taiwan, situated to the north and structurally much higher than wells formerly drilled on the south plunge of the Chutauchi structure, produced an average of 50 barrels daily by swabbing in the last two weeks of January. Afterwards it flowed intermittently at the rate of 30 barrels daily, and has been producing more than 60 barrels daily by pumping since mid-February.

The light paraffin-base crude, of 38.9° gravity, and with a gasoline content of 35 percent, is being produced from a fractured sandy mudstone about 50 feet thick, the top of which is at a depth of about 2590 feet. Indications are that this zone is above the objective horizon, so a strong possibility exists for finding deeper productive zones. Although productivity is small by most standards, this location is still well below the culmination, and better productivity may be expected elsewhere along the structure where difficulty of access to this precipitous hilly terrain has hitherto discouraged drilling.

However, in countries like Taiwan and Japan, where labor costs are low and old stocks of oil field equipment are still available, a well about 2000 feet deep with an initial production of 20 barrels daily is generally profitable. An ultimate production of about 10,000 barrels is usually sufficient to cover the original investment. The principal significance of new production of domestic crude in such Asiatic countries which are still far from attaining self-sufficiency in oil supply lies, however, more in the fact of the saving in foreign exchange expenditures on essential imports, of which oil is a major item; under these circumstances even uneconomic production



IN THE FOREGROUND is Taiwan's second deepest well, Kinsui R-32, which was drilled prewar by Japanese to 11,483 feet. The well is in the Cinusui field.

is often supported by the government and subsidized with local currency.

Small Production. Taiwan has produced small quantities of generally light crude since early in the century. But the highest annual production to date was only about 140,000 barrels in 1927. Cumulative production to 1952 is only about 1,350,000 barrels.

Natural gas production has actually been of more significance in the past than crude production. For several years during the 30's before much of the gas was diverted to carbon black production, the volume of natural gasoline produced from wet gas exceeded that of the crude production. Under the Japanese Empire, and principally at the instigation of the Japanese Navy, which held some areas as a naval oil reserve, considerable effort was put into developing the oil and gas resources of Taiwan. Although many structures were surveyed and tested, only seven productive fields have been discovered to date. Of these (see map), Chuhuangkeng (known as Shukkoko under the Japanese regime) alone has produced more than 95 percent of Taiwan's crude. The others are almost entirely gas producers; Chinsui (Kinsui) field has produced 32 Mmcf since 1921, Chutung (Chikuto) field about 4 Mmcf since 1934, Chuhuangkeng field about 3 Mmfc since 1920, and the four small southern fields a total of 5.5 Mmcf since 1937.

During World War II, crude output steadily declined from an annual production during the 30's of about 37,000 barrels to about 15,000 barrels in 1945, when Taiwan was returned to China. Under the Chinese National Government, the government-owned Chinese Petroleum Corporation (CPC) which took over the oil and gas fields, has maintained an average annual output over the past eight years of about 21,000 barrels of crude. But production of both oil and natural gas has shown a steady decline since 1950.

Soon after the return of Taiwan to China, Hoover, Curtice and Ruby Inc., which surveyed the oil potentialities of mainland China and Taiwan for the Chinese government, pointed out the possibility of existence of petroliferous structures under the western plain area and recommended geophysical survey. In 1946 and 1947 Chinese Petroleum conducted a gravity survey of the western plain and followed up with two unsuccessful wildcats on conspicuous anomalies. Two out of three outpost wells drilled around this time in the south part of Chuhuangkeng field produced some oil, but the over-all lack of immediate success and the limited means for undertaking exploration on a proper scale resulted in suspension of active exploration in 1949.

Interest Picks Up. Assignment of Dr. Hubert G. Schenck as chief of the MSA Mission to China in 1951 again stimulated interest in the oil potentialities of Taiwan. Apart from his prewar experience in oil exploration, this well-known stratigrapher and paleontologist from Stanford University had transferred directly from Japan where, as Chief of the Natural Resources Section of General MacArthur's Headquarters in Tokyo, both oil production and reserves had been nearly doubled under his administration.

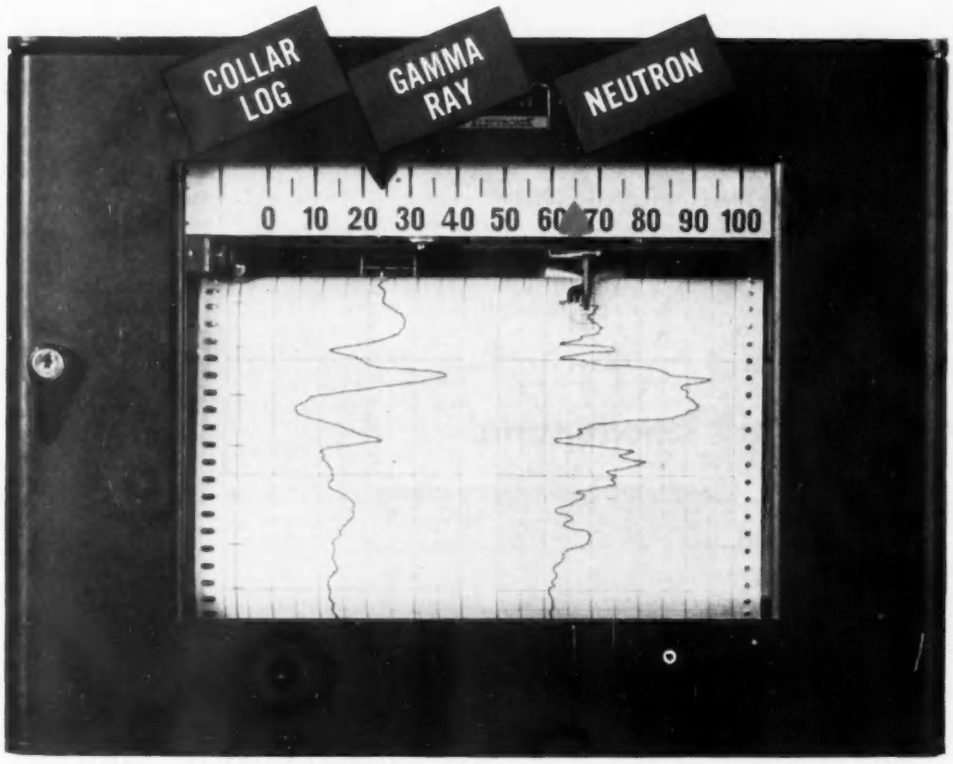
As a result of this reawakening interest, Chinese Petroleum invited the writer early in 1952 to visit Taiwan to review prospects and to develop an exploration program within

TYPICAL WELL site is shown here in the Chuhuangkeng oil field in central Taiwan. This terrain is found in most potentially productive areas in Taiwan.

Here's how

LANE-WELLS DUALIZED LOGGING

cuts your down-time



ALL 3 ON ONE RUN

And Lane-Wells DUALIZED Logging gives you the same sharp, fully-detailed curves as always, the same *complete* down-hole information which operators have found accurate and reliable in more than 60,000 Lane-Wells Radioactivity Well Logging jobs.

write for full information

LANE WELLS COMPANY
TECHNICAL OIL FIELD SERVICES

Radioactivity Well Logging

LR-83-A

General Offices, Export Office and Plant • 5610 So. Soto St. • Los Angeles 58, California

Los Angeles • Houston • Oklahoma City • Lane-Wells Canadian Co. in Canada • Petro-Tech Service Co. in Venezuela

the scope of the country's resources of finance, equipment and technical personnel. The MSA Mission to China later brought out Howard Myers, geophysical consultant, for a month to study the western plain area as a preliminary step for future seismic survey; the writer made a later visit in 1952 and arranged for a series of detailed subsurface studies which were made in 1953. Recently also, Charles Meissner, petroleum geologist formerly of Gulf Oil Corporation, was assigned to the staff of MSA Mission to China as a technical assistant consultant at the request of the Chinese government to assist CPC.

TAIWAN OIL FIELDS: 1. Chutung; 2. Chinsui; 4. Chuhuangkeng; 5. Tungtsechiao; 6. Liuchunghsi; 7. Niushan; 8. Chutauchi. Other numbered areas include 3. Pakari and 9. Kosen—each of which has unrecorded small amounts of oil and gas from one well.

The known petroliferous area of Taiwan, which includes the present fields producing from a number of zones in the Miocene, comprises all the area of Neogene sediments, mainly marine, that occupy the western half of the island west from the sharply defined contact with the structurally complex and partly metamorphosed Eocene shales, slates and sandstones. Areas of Neogene marine sediments of less immediate interest are the narrow strip along the east coast, and the southern promontory of Taiwan.

Neogene sediments of the western half of the island, covering an area of about 3500 square miles, consist of a practically unbroken sequence of dominantly marine clastic rocks which in the north become in part estuarine, and in the south contain a few scattered lenses of reef limestones at different stratigraphic horizons. Total thickness of the Neogene sequence is in excess of 20,000 feet, and the range in age is from early Miocene to Plio-Pleistocene.

Except in the northern part, Neogene sediments, consisting of thick mud-stones, shales, siltstones, sandstones, and alternations of sand, shale and silt were deposited under predominantly moderately deep water conditions, but the Plio-Pleistocene sediments are much coarser and, in part, are represented by thick conglomerates deposited during an emergent phase near the close of Pliocene time.

The great thickness of dark marine shales found in the Miocene portion of the sequence alone would seem sufficient to provide an abundant source for crude petroleum in this province. The sandstone members suitable for reservoirs, although generally rather low in porosity and permeability, are often of considerable thickness and areal extent. In no place has the normal depositional relation between the Eocene and younger sediments been observed.

The Eocene-Miocene contact, which runs longitudinally from north to south through the middle of the island, is regarded as a high-angle thrust which thrusts up the Eocene from the east; west of this fault contact no sediments older than Miocene are exposed, or have been encountered by drilling. It is possible, however, that sediments older than Miocene may exist below the Miocene west of the Eocene-Miocene contact, and that these sediments may also be potential source rocks.

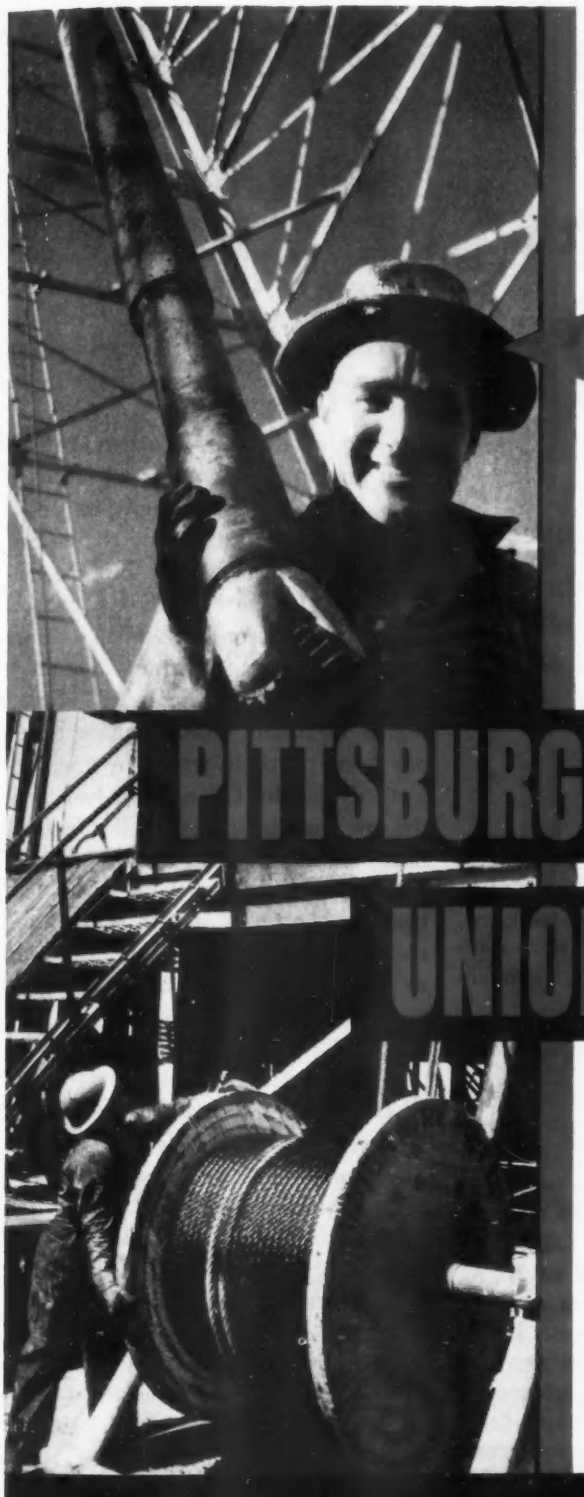
Strong Folding. Neogene sediments west of the Eocene-Miocene contact have been subjected to strong folding and thrust faulting which near the contact has resulted in development of a series of long narrow imbricate zones. Farther west, however, faulting is less evident and folding is not so intense. Of the many structures so far tested, all of those proved productive, with the single exception of Chutauchi field, lie to the west of the zone of strong thrust faulting. The youngest rocks exposed in the cores of these structures are not younger than early Pliocene and these structures are usually flanked on the west side by broad synclines which provide large potential gathering areas.

In the plain area to the west of the exposed folds, the existence of anticlinal folds concealed beneath the superficial alluvial deposits could reasonably be expected, and the possibility of stratigraphic and lithologic traps also should not be overlooked. It could be inferred, too, that the buried folds may be broader and more gentle than those exposed in neighboring foothills.

After study of available data on previous exploration by the Japanese, it became clear to the writer that, with the exception of Chuhuangkeng (the largest oil field), Chinsui (the largest gas field) and the small Niushan dome, production in the other fields was developed very low on the plunge of major structures whose large culminations still remained untested, partly because of terrain difficulties. Also test locations selected for a number of other structures were not always well situated and sometimes not sufficiently deep to reach potential targets. In view of the limited availability of technical personnel, finance and equipment it was, therefore, decided to concentrate on the more obvious prospects that still remained to be tested and postpone a considerably more expensive geophysical program for a later occasion.

After preliminary surveys, the first new well outside a known producing area was drilled in 1953 at Fanpo-

Continued on Page 274



LUCEY EXPORT

International Distributors of

PITTSBURGH STEEL
OIL COUNTRY
TUBULAR PRODUCTS

UNION WIRE ROPE

LUCEY EXPORT CORPORATION

233 BROADWAY, NEW YORK 7, N. Y.

Wheland Rotary Drilling Equipment
"Totco" Drift and Directional Recorders
Union Wire Rope
Lucey Boilers & Insulation Casings
Pittsburgh Steel Tubular Products
Reddaway Brake Blocks

Broad Street House . London, E.C. 2, England • Sterling Building . . . . . Houston, Texas • Calle Defensa 320 . . Buenos Aires, Argentina • Calgary and Edmonton . . . . . Alberta, Canada Rua do Carmo, 8–7 . . . Rio de Janeiro, Brazil

Reef Prospects Lie Beneath Bonaparte Gulf Basin Area

Regional aspect of the problem of discovering oil in Australia is an important factor for consideration.

By DR. WERNER F. SCHNEEBERGER,
Anderson-Pritchard Oil Corporation, Denver

The Bonaparte Gulf basin was not mapped while the author was with the Bureau, although it had formed part of the mapping program. It had been visited, however, by a geological party of the Western Australia Geological Survey (Matheson and Teichert, 1947).

Its stratigraphic record differs from that of the Fitzroy basin insofar as Cambrian and Carboniferous sediments are present, Ordovician and Lower Devonian missing.

Overlying quartzite and sandy shale of Upper pre-Cambrian Nullagine series are sporadically-spread Lower Cambrian basalts. They are overlain by 2000 feet of Cambrian shale, sandstone, calcareous sandstone, and thin limestone with fossils.

Upper Devonian is represented by red, coarse sandstone, conglomerate and sandy shale with *Lepidodendron australe* (Cockatoo, 3000 feet) and calcareous sandstone, fossiliferous sandy limestone, stromatoporoid reefs and calcareous shale (Burt Range, 3500-4000 feet).

There are an estimated 250-300 feet of marine fossiliferous limestone, calcareous shale and sandstone to which a Carboniferous age is assigned.

The Permian consists of 1000-2000 feet of sandstone, boulder conglomerate, some limestone, and shale. It is thinner than in either the Northwest or the Fitzroy basin.

The only Mesozoic beds are thin radiolarian-bearing clays with Cenomanian ammonites, sand, and conglomerates. They would possibly not be thick enough to act as an oil trap.

Structurally, Bonaparte Gulf basin has some similarity with Fitzroy basin, with the difference that its trend is northeast instead of northwest. It can be interpretated as a graben, the western part of which is submerged in the Indian Ocean. A major fault system bounds it to the southeast, against the pre-Cambrian Nullagine series. Similar to Fitzroy basin, there is indication of draping of the Permian beds either over basement buried ridges or Devonian reefs.

Although that part of the basin which is not submerged is only about 200 miles long and at an average 40 miles wide, it should offer good Devonian reef prospects.

East Central Queensland. Whereas prospects of Western Australian basins are Permian-Mesozoic overlaps, Devonian reef and Ordovician possibilities, the play in East Central Queensland is either for a transition in the Permian from a continental-glacial facies in the west into a partly marine facies in the east, marginal to the Tasman geosyncline, or for overlap conditions between Permian and Mesozoic, which appear to exist in places.

Although this part of Australia has been known for years for oil and gas shows in a number of wells, its prospects appear less promising than those of Western Australian basins. On the other hand, apart from the rather small area (Roma) in which drilling activities were concentrated, it cannot be said that the remainder of the region of about 40,000 square miles has been properly tested by the two wells drilled by Oil Search, Ltd. and the one well drilled by Shell (Queensland) Development Pty. Ltd.

The area discussed here is situated between the great Bowen syncline in the east and the Great Artesian Basin to the west and south, between 22 and 29° Southern Longitude, 146 and 150° Eastern Latitude (see Figure 5).

Its structural backbone is formed by the granite and schist core of Anakie uplift which plunges gently to the southsoutheast. On its southern extension, western anticlines of the Carnarvon anticlinorium appear to be superimposed.

Within the area west of the Anakie uplift, Middle and Upper Devonian and Lower Carboniferous rocks are exposed, mainly developed in a non-marine, shallow water and volcanic facies. Aggregate thickness of these formations is of the order of 15,000-20,000 feet. Litho-facies studies revealed they are non-prospective.

Resting on these sediments with a strong regional overlap were found about 7000 feet of Permian sediments of a continental, mainly glacial, origin. In the lower 2500 feet there occur two tillities separated by varve

Part 3

This is the third part of an expert's geological appraisal of the oil possibilities of Australia. Parts 1 and 2 which appeared in the September and October issues of WORLD OIL dealt with the Northwest, Coastal, and Fitzroy basins.

for releasing stuck tubing strings...

BAASH-ROSS PRODUCTION SAFETY JOINTS

CHOICE OF

right hand rotation compression release

left hand rotation compression release

right hand rotation tension release

left hand rotation tension release

Low-cost assurance of releasing tubing from stuck packers or sanding conditions

A type for every production string... leak-proof seals ...easy to unlock... quick release... choice of releasing actions... selective release of multiple units.. unique lock permits heavy rotational loads... no danger of over-tightening... no friction or tapered shoulders involved... I.D. same as tubing string... O.D. same as tubing couplings.

BAASH-ROSS TOOL COMPANY

Los Angeles...Houston...Oklahoma City...Odessa...Casper...Canton, O....New York City

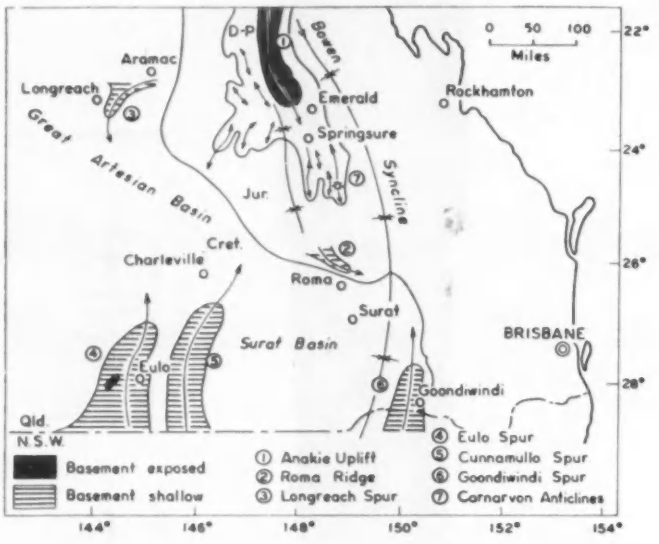


Fig. 6—Structural sketch map of Central Queensland.

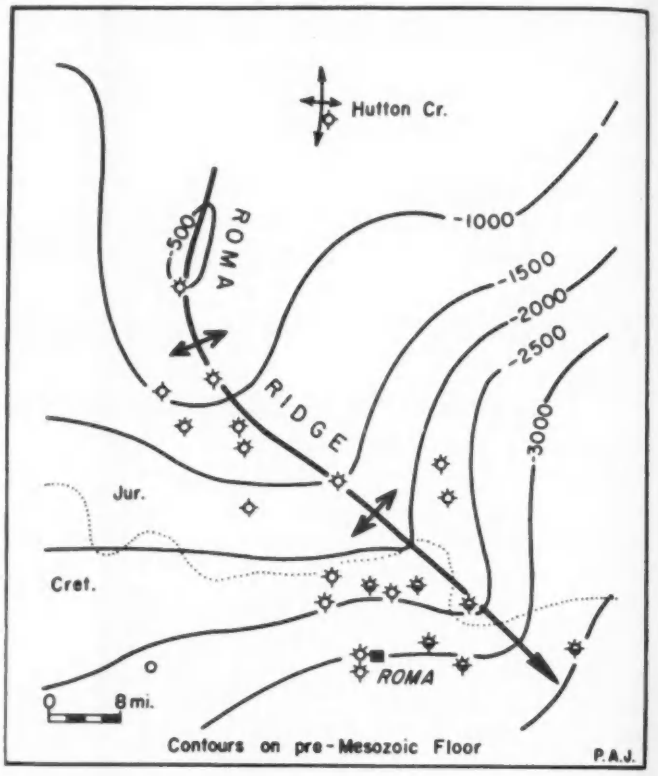


Fig. 5 (right)—Subsurface map of Roma Ridge.

shale and sandstone of an interglacial period. The upper 4500 feet consist mainly of fluvial and fluvio-glacial sediment. Remains of an abundant Gondwana flora in both the lower and the upper part indicate a Permian age.

A short-lived marine transgression into this area of otherwise continental facies condition is evidenced by an up to 50 feet thick sandy limestone with an abundant fauna of productids. This "Mantuan Downs Productus Bed" forms the base of the uppermost part of the Permian sequence of about 1300 feet of non-marine soft buff and yellow sandstone, chocolate brown and grey shales with abundant fossil wood.

The interesting fact from an oil geologic point of view now is the transition to the east of the continental-glacial Permian sediments into a partly marine facies. Tongues of marine facies extend from the east to the west and interfinger with non-marine facies members. In parts marine members still show the influence of the ice sheet to the west in the form of glacial boulders deposited in an irregular fashion within marine fossiliferous sediments. Shore line of this Permian sea must have oscillated in a zone now occupied by a wide syncline to the west of the Carnarvon anticlinorium.

Lower portion of the uppermost Permian beds shows a change from mainly clastic non-marine facies in the west to a bituminous facies in the east. However, an abundant Glossopteris flora in the same beds suggest a non-marine, possibly lacustrine environment. Therefore, this bituminous facies does not attain the same significance as does the black shale—evaporite facies of the uppermost part of the Permian in Western Australia.

Structurally, the area is uncomplicated, provided the fact is taken into consideration that part of it very likely is underlain by the southern extension of the Anakie basement uplift. This possibility was realized as early as 1942 on results of a rapid gravity reconnaissance. Should the area be reconsidered for an exploration venture by interests not familiar with it from previous work, a regional gravity survey followed by seismic in selected areas and on all surface structures is recommended.

Shell's Morella well is reported to have run into andesite at 4634 feet. Oil Search's Arcadia well reportedly at 4434 feet entered a steeply dipping series of conglomerate, gritty sandstone and andesitic agglomerate. It has been generally assumed that the andesite is of Permian age, Lower Bowen of Queensland terminology. However, identical andesite was found to form part of the Middle Devonian section only 80 miles to the northwest of the Morella well site.

There, lenses of crinoidal limestone with Mid-Devonian corals are interspersed with the andesite. Influence of Middle Devonian andesite and associated rocks on the gravimeter was stronger than that of granite and schists of the basement complex. For all practical purposes, those rocks can be considered as basement.

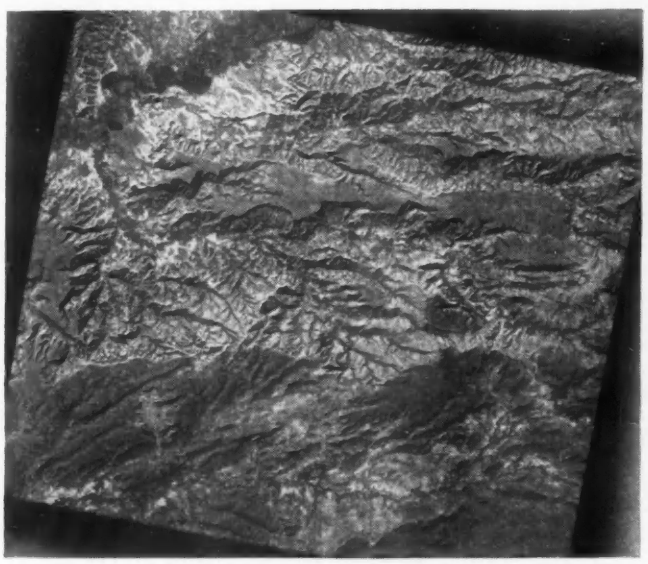
Arcadia well is interesting because of its strong gas shows. It was drilled on the anticline of the same name, a major structure at least 16 miles long and more than 8 miles wide, with a steep west and a gentle east flank. Location of the well is exactly on the surface axis.

Between 2535 and 2687 feet the well penetrated a zone of Permian marine sand, sandy shale and black shale. Two sands had flows of 250,000 and 2 Mmcf. of wet gas per day, respectively. Higher hydrocarbon homologues were reported at around 7 percent, carbon dioxide at 68-71 percent.

As in northeast Mexico, east Borneo, Wasatch Plateau, here carbon dioxide seems to be connected with past volcanic activity (Carnarvon basalt plateau, plugs). Because of the presence of higher homologues, the question arises whether a well down

AERIAL EXPLORATION HELPS THE OIL INDUSTRY IN TWO WAYS

Provides photo-maps and detailed air photos which often yield important facts about surface geology and general trends. Useful, too, as base maps for all surface work.

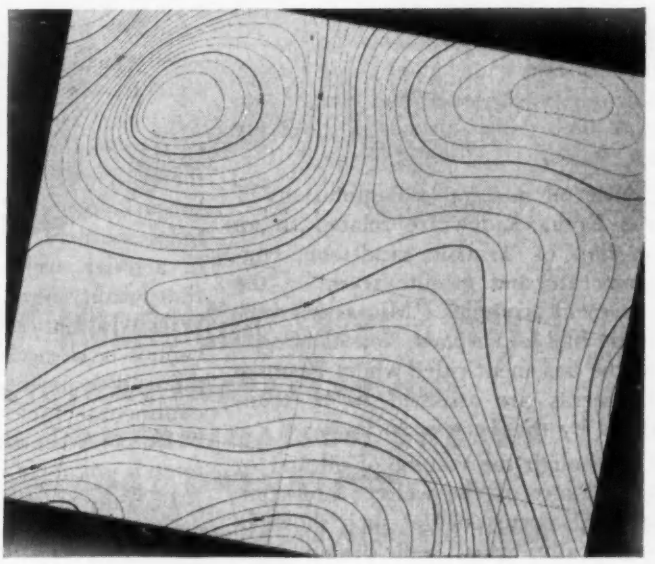


Air photos are useful in geologic study and exploration planning.

Today, footslogging *follows* aerial exploration. Now ground crews are directed to the most promising areas by the mapping camera and airborne magnetometer. By their use, difficult and expensive ground surveys are expanded in effectiveness and reduced in cost.

AERO, and its affiliate, AERO (Mid-Continent), leaders in photo-mapping and airborne magnetometer surveys, cut exploration schedules from years to weeks or months.

Furnishes aerial magnetic data that is dependable—precise—complete. Only the airborne magnetometer can provide significant facts about regional trends and basement structures so swiftly and economically.



These anomalies are typical of the magnetic figure in petroleum exploration.

Our stereo-photos and photo-maps are valuable for geologic study and exploration planning. And regional reconnaissance with the airborne magnetometer provides more important guideposts for ground parties.

Our broad experience in Canada, the Southwest and West and all over the world, can carry forward your exploration at a fraction of the cost of ground surveys. *Write us.*

AERO
SERVICE CORPORATION
(Mid-Continent)
4410 PEORIA ST., TULSA, OKLA.

TOPOGRAPHIC MAPS
PLANIMETRIC MAPS
PRECISE AERIAL MOSAICS
AIRBORNE MAGNETOMETER SURVEYS
RELIEF MODELS
COLOR PHOTOGRAPHY

AERO
SERVICE CORPORATION
PHILADELPHIA 20, PENNSYLVANIA
Oldest Flying Corporation in the World

the east flank would not have had a better chance. In the author's opinion, the Arcadia well at its location on the anticlinal crest did not test the structure adequately but did only tap its gas cap with possible oil accumulations left untouched downflank.

To the south the structures of the Carnarvon anticlinorium disappear under the Triassic-Jurassic overlap. For a part they are faintly reflected in the Mesozoic sediments, like Hutton Creek anticline which was unsuccessfully tested by Oil Search in 1939.

To the north of town Roma, there is a basement ridge beneath the Mesozoic cover, called the Roma Ridge, the existence of which was proved by many wells drilled in this area, following the discovery of gas in a well drilled for water at Roma in 1900, (see Figure 5). Most of the 37 wells had oil and gas shows at around 3700 feet. Some produced a few gallons of oil and one had 40,000 cubic feet of gas a day. Another one caught fire and reportedly burned in 1907 for six weeks.

The oil and gas accumulations of the Roma Ridge are related to an overlap of Triassic sandstone, conglomerate and granite wash on the basement complex. Migration very likely had taken place from the flanks of the basement ridge where Permian sediments are assumed to be truncated by the Triassic rocks.

Although the volume of oil and/or gas in any of the wells is non-commercial, occurrence of such shows in practically every well drilled in a comparatively small area, appear significant. To evaluate the prospect properly, it is necessary to step out from the drilled-up area and to explore by seismic flanks of the ridge, especially its northeast flank, where it should be possible to locate the overlap of Triassic onto Permian rocks.

Should commercial accumulation as flank pools of the Roma Ridge be proved, the whole area to the south of Roma as far as the Queensland/New South Wales border and from 146 to 150° longitude would come under consideration. This is a basin entirely covered by Cretaceous, bounded to the west by two basement ridges (Eulo and Cunnamulla spurs), with numerous artesian wells reported to have reached basement, and to the east by a similar ridge near Goondiwindi, with several artesian bores to basement.

Its deepest part presumably is formed by the southern continuation of the Bowen syncline, and the Surat basin south of Roma. Its area is approximately 66,000 square miles. A gravity reconnaissance along existing roads and trails, followed by detail gravity and seismic surveys of the most promising anomalies is recommended as the most economic approach.

A study of all water well logs available at the office of the Waterboard could help. However, before beginning that venture, a concentrated effort should be made first to establish flank production on Roma Ridge.

A similar situation seems to present itself near Longreach in Central Queensland (see Figure 6). There, logs of artesian wells, of which about nine are reported to have bottomed in basement, indicate a pre-Mesozoic spur trending from Aramac (about 70 miles northeast of Longreach) southwest toward Longreach and there to swing to the south where subsurface control is lost about 40 miles south of Longreach. Oil shows in artesian wells in the vicinity of that locality were reported years ago. Which formation this oil came from cannot be answered because the Permian likely is entirely developed in a continental facies, and presence of Paleozoic sediments older than Permian is unknown.

Because of the scarcity of surface exposures and practical absence of folding in Cretaceous surface beds, evaluation of the prospect has to be based on gravity and seismic work.

Following are two possibilities—gas prospects in Sydney basin and Tertiary overlap conditions on south coast of Victoria—which are not as remote as sometimes described and are worth consideration.

The Sydney Basin. Sydney Basin is a depositional and structural basin of about 15,000 square miles. An unknown portion of it is submerged in the Tasman Sea. It is situated in the same facies province as Central Queensland, with Permian developed in a succession of marine and non-marine, partly glaciated formations. They are in ascending order: Lower Marine series (1000-1500 feet of sandstone and shale with scattered erratics), Greta Coal measures (200-500 feet of sandstone and carbonaceous shale with coal beds), Upper Marine series (about 2000 feet of marine shale with glacial pebbles), Upper Coal measures (1660-1870 feet of carbonaceous shale, sandstone and conglomerate).

Above the Permian sequence lie the Triassic Narrabeen (1500 feet of shale, sandstone and conglomerate), Hawkesbury sandstone (1000-1500 feet of cross-bedded sandstone with shale, widespread in central part of the basin) and the Wainamatta (500 feet of sandstone and shale).

Permian sequence is underlain by Lower Carboniferous mudstone, volcanic tuff and lava and Devonian sediments. They are, similar to corresponding formations in Central Queensland, non-prospective.

The basin is gently folded into several anticlines and domes. Only in the west, along the front of the Blue Mountains and in the lower Hunter Valley, is structure more complicated.

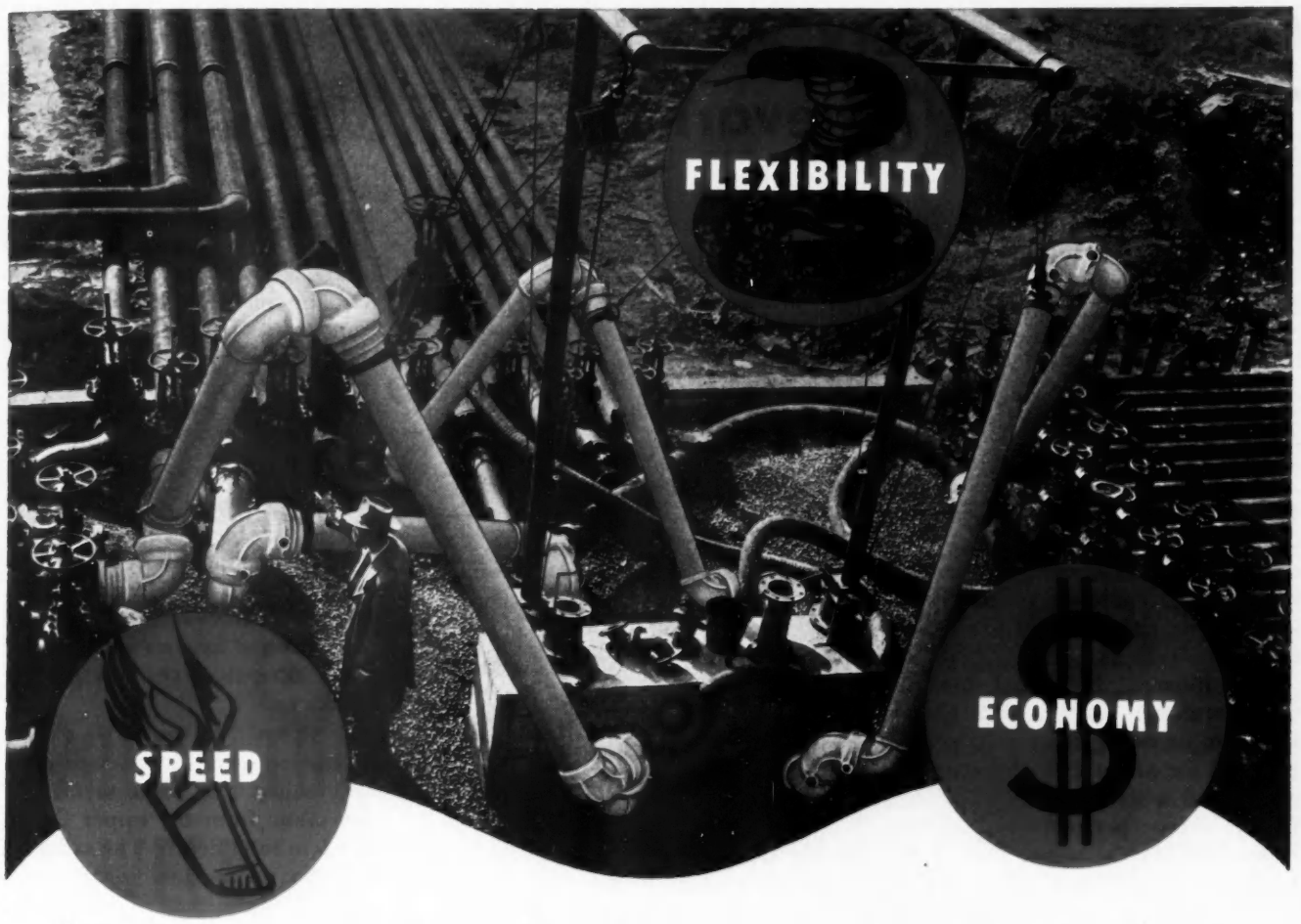
Prospects are entirely gas prospects. In the author's opinion these have not been tested adequately yet, although 12 tests have been drilled for oil, gas and coal. Most of these tests had non-commercial gas shows.

Systematic surface mapping based on aerial photos, followed by gravity and seismic activity in areas of poor surface expression, appear to be the logical approach. The first-rate and ready market of the industrial area of Sydney and environs appears to warrant such a venture.

South coast of Victoria. Along the south coast of Victoria, Tertiary sediments, ranging from Oligocene to Pliocene and consisting of calcareous and glauconitic sand, marl and limestone, overlap the pre-Cambrian basement in the east and Jurasic, coal-bearing sediments in the west. Thickness of Tertiary section is 1200 feet in the east (Lakes Entrance) and 2400 feet in the west (Lake Victoria). The beds dip seaward at 2-3 degrees.

Lakes Entrance has been the scene of drilling and small-scale production since 1924 when a water well found, besides water, a small amount of oil in glauconitic sand at about 1200 feet. The sand, at the base of the Miocene, is about 30 feet thick with an average porosity of 15 percent. It

Continued on Page 274



CHIKSAN Swivel Joints illustrated in this installation, facilitate the speedy, economical handling of various fluids through 16 lines from loading dock to manifolding pit — a distance of 800 feet. Since each line leads to a separate tank through the manifold, cross contamination is eliminated.

CHIKSAN Swivel Joints in the pump manifold above enable operator to pull base stock from outside storage into the plant and direct flow to proper vessel or proportioner.

The Flow of Enterprise Relies on

CHIKSAN

Ball-Bearing Swivel Joints

CHIKSAN Manifolding Saves 3 Ways!

- √ ORIGINAL INSTALLATION
- √ NO CONTAMINATION LOSSES
- √ LOW COST OPERATION

Original cost of CHIKSAN flexible line manifolding installations often run as much as 50% less than fixed line manifolding operations which incorporate costly multiple valve and line systems.

A CHIKSAN manifolding operation is simplified in its entirety — providing complete flexibility, mobility and ease of operation in limited spaces.

CHIKSAN manifolding installations reduce line hook-up time — keep pit floor clear of lines thereby providing greater working areas.

CHIKSAN manifolding operations facilitate the transfer of all types of fluids safely and rapidly under extreme climatic conditions with no possibility of cross contamination.

CHIKSAN manifolding installations are specifically engineered for long life — easy and economical maintenance, and render years of trouble-free operation.

Our Engineering Research and Development Department will welcome inquiries on your manifolding problems.

Write for Catalog 53-C, Dept. 11-WO

CHIKSAN

Representatives in Principal Cities

CHIKSAN COMPANY • BREA, CALIFORNIA • Chicago 28, Illinois • Newark 2, New Jersey

Well Equipment Mfg. Corp. (Division), Houston 1, Texas • Chiksan Export Company (Subsidiary), Brea, California • Newark 2, N. J.

Cuba's Discovery Well Logs Tell Story of Echevarria 1

Newly-released data of high interest to lengthening list of firms and individuals eyeing island operations; intensive field play expected.

DR. R. G. HAMILTON, of Hamilton Well Log Consultants, Tulsa, has completed a 30-page report covering detailed analyses of well logs recorded in the Cuban discovery well, Echevarria 1, near the town of Jatibonico, Las Villas province, Cuba.

The discovery attracted international attention and set off a Cuban oil boom following the completion of the well for about 240 barrels of 15-gravity oil a day, natural. The well flowed from perforations opposite clastic rock in the upper part of the upper Cretaceous at 1072-88 feet.

The strike is particularly significant because it penetrated 8375 feet of sedimentary rocks having hundreds of feet of porous and permeable sections, and because commercial production was obtained from sediments.

Previous production in Cuba was from fractured Serpentine, principally in the fields of Jarahueca, Motembo and Bacarunal.

The well was drilled and completed under the supervision of Kerr-McGee Oil Industries, Inc., and the Groupe-Jarahueco-Motembo Company, managed by Antonio Iglesias of Havana, Cuba.

Dr. Iglesias engaged Hamilton in April to go to Cuba to supervise the well logging and to interpret the results. Hamilton's preliminary report in Havana recommended testing these formations: 1630-42 feet, 1304-30 feet, and 1072-1130 feet. Later studies indicated oil or gas possibilities from thin, porous streaks in the interval at 1840-2000 feet.

The zones at 1630-42 feet and 1304-20 feet were perforated and partially tested, producing some oil and gas, drilling water and mud. The zone at 1072-1130 feet was tested to produce oil commercially. The 1840-2000 foot interval has not been tested. Some of the water obtained during tests of the 1630-42 foot zone is believed to be true formation water.

Dr. Iglesias has released all information in the detailed report to Hamilton. A brief resume follows:

1. Seven well logs were recorded in the Echevarria well including the section gauge, standard electric log, microlog, limestone curve, temperature survey, gamma ray log, and dipmeter surveys.

2. Detailed information is given regarding mud properties, the resistivities of drilling mud, mud-filtrate and mud cake and the resistivities and salinities of formation waters.

3. Porosities, water saturations and probable productions are tabulated for 93 permeable and porous formations.

4. Twenty-nine formations had indications of some oil or gas or asphaltic deposits. Only four of these are considered to have commercial possibilities in the Echevarria well. The others contain too much connate water or are too thin. Many with slight shows may produce on the structure when found higher. Twelve formations with shows are above 2054 feet, 12 in the depth interval 2054-4170 feet and only five below 4170 feet.

5. The entire section penetrated to a total depth of 8375 feet contained about 750 feet of clastic rock having intergranular porosities of eight percent or higher. Of this total, 600 feet lies above 5000 feet.

6. Dipmeter data indicate a general south dip of all beds from the surface Oligocene through the Eocene and the upper part of the Cretaceous to 2200 feet. Below 2500 feet, the dips are reversed sharply to the north, continuing north to about 4200 feet. There is an indication of a fault, unconformity or strong structural feature at 2300 feet. Dips below 4200 feet, the level of the middle Cretaceous or the Jiquima, are to the east, probably marking the angular unconformity. In the lower part of the well the few dips obtained are to the north again.

7. Radioactivity intensities are "reversed," as is common in many granite wash and continental deposits. Shales have the lowest values. Siltstones and clastic rocks have slightly higher intensities. Limestones have still higher radioactivities and igneous and volcanic rocks have the greatest gamma ray kicks.

8. Formation waters are not particularly saline and seem to become less saline from the upper Cretaceous to total depth. The salinities of formation waters in the lower section of the well, which probably are in continental type deposits, are similar to salinities in like rocks in eastern Venezuela and parts of Mexico.

9. The combination of well logs employed in the well produced valuable information that will serve as a guide to future exploration around the well and for exploitation of oil and gas possibilities in the many permeable formations logged.

Since the logging of the Echevarria well, Hamilton has made three trips to Cuba, spending about 12 weeks in the company of Cuban and American oil men and geologists.

He has traveled about 8000 miles in the interior by plane, Jeep and ox-cart and has obtained around 200 color photographs in out of way places. He has visited every producing area on the island and many isolated wildcat dry holes drilled years ago.

Since completion of the Echevarria 1, a number of American oil companies and businessmen have become interested in Cuba and, if announced plans are carried out, an intensive

Continued on Page 276

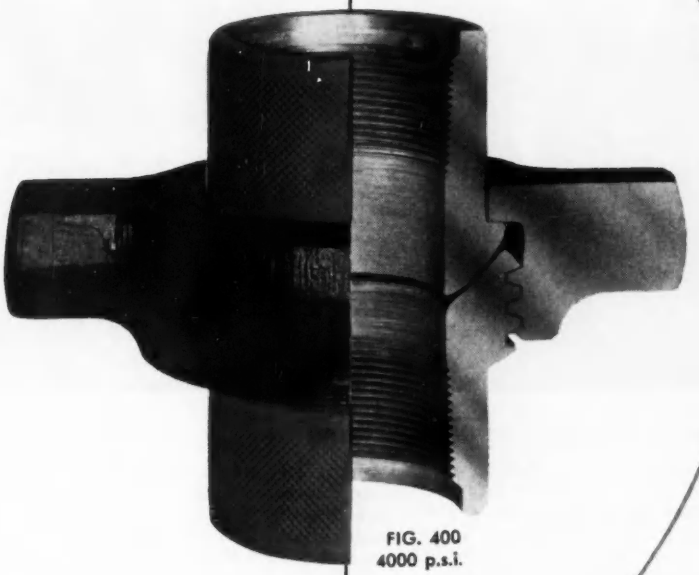


FIG. 400
4000 p.s.i.

WHERE THERE'S A WELL... THERE'S WECO

WECO Unions have a way of saving time and trouble—of giving long, care-free service that operators like. That's why you'll find WECO Unions wherever rigs are running, wherever wells are producing, wherever Supply Stores are serving the oil industry.

The ball and cone seat always makes a leak-proof seal—the wing nut with Acme threads draws up tight with a few hammer blows—precision machined pipe threads mean easier make-up and leak-proof connections. WECO Unions are made stronger, tougher to last longer in all kinds of service.

Standardize with WECO Unions—there's a size and pressure available for every oil field service.

PESA
PETROLEUM EQUIPMENT SUPPLIERS ASSOCIATION
PARTNERS IN PETROLEUM PROGRESS

it's wise to standardize with.. **WECO**

WECO®

WELL EQUIPMENT MFG. CORP. • Division of Chiksan Company • HOUSTON 1, TEXAS

What's Happening

AMONG WORLD OIL MEN

Nomad Visitors Attend Meeting

Guests at a recent meeting of the Los Angeles Chapter of Nomads were, standing left to right, M. F. Burgett, Santa Fe Drilling Company, Bahrain Island; W. E. Childers, Mene Grande Oil Company, Venezuela; E. J. Beal of Oil Drilling Explorations, Ltd., Australia; John B. Tillott, Sarawak Oilfields Ltd., Borneo; Ceser Rodrigues, Gobierno de Cuba, Cuba; and George A. Seiglie, Gobierno de Cuba, Cuba; Seated, left to right, are Hugh Thompson, consultant to California Texas Oil Company; H. M. Wagner of Convair; R. E. Bales, California Texas Oil Company, Sumatra; and J. B. Stovall, Drilling & Exploration Company, Iran.

GEORGE M. CUNNINGHAM, American geologist, is in Australia to offer his advice in connection with oil drilling operations now being carried out by West Australian Petroleum Pty. Ltd., in the North-West Cape area.

Cunningham, president of American Overseas Petroleum Limited, exploration affiliate of the Caltex Group, will confer with WAPET officials on the progress made in geological and geophysical surveys and in exploratory drilling in Western Australia since his last visit in January.

•

S. Z. NATCHER, formerly assistant to the vice president-conservation of Standard Oil Company of California, has been named resident executive in London, England, where he will be principally concerned with Standard's interest in Iran. Natcher previously was headquartered in Los Angeles.

E. D. WILSON has been appointed a management assistant in Imperial Oil Ltd.'s Western Producing division, and a member of the division management committee.

Formerly assistant manager of Imperial's Regina Exploration district, Wilson was born in Gateshead, England. He went to Canada and to Calgary at an early age and was educated in Alberta, graduating from the University of Alberta in 1939 with a degree in mining engineering. After graduation he joined the Royalite Oil Company. In 1941 he joined the RCAF, serving as a navigation instructor, staff officer and navigator.

Discharged in 1946 with the rank of squadron leader, he joined Imperial's Producing department in a production and petroleum engineering capacity. In 1948 he became division petroleum engineer, and in 1950 was transferred to the Producing department in Toronto as operations advisor. In 1952 he became assistant manager of the Regina Exploration district.

D. E. DAVIS, a 30-year veteran of the international petroleum industry, has been appointed manager of Standard-Vacuum Oil Company's Producing Department in New York. He succeeds E. W. BERLIN, whose temporary assignment with Stanvac's operating subsidiary in Indonesia has been extended.

D. E. Davis

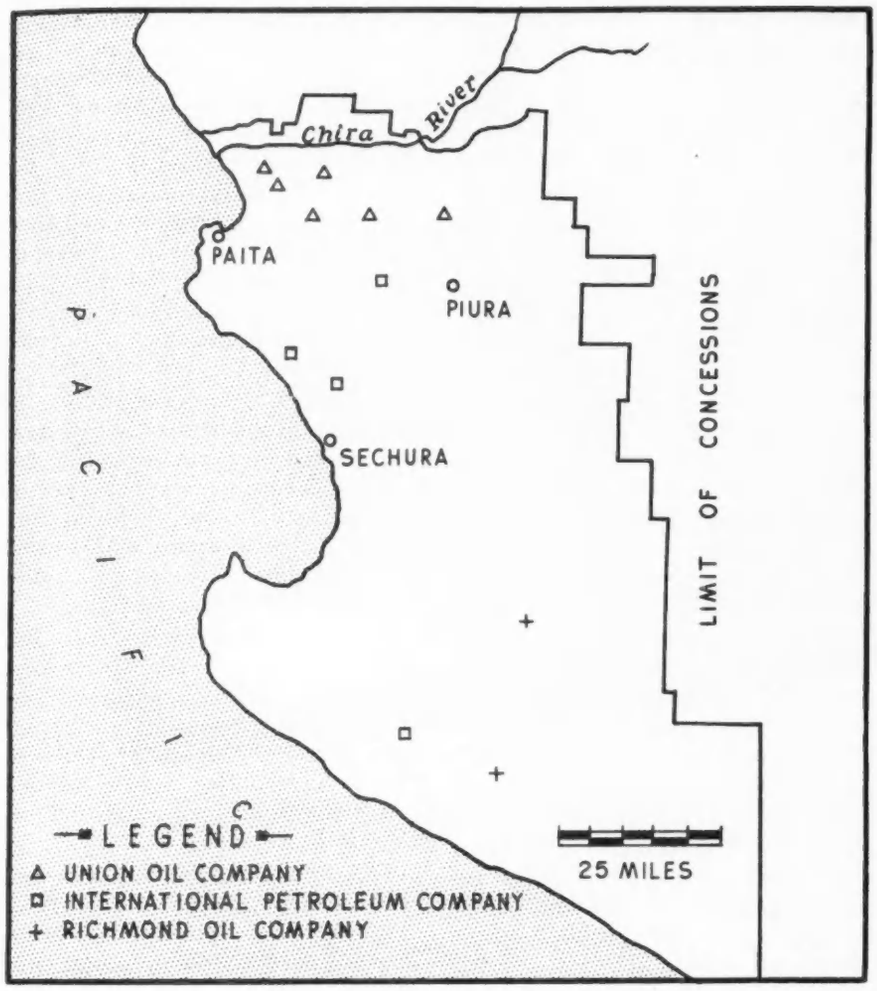
Davis, a graduate in mining engineering at the University of Washington, started his oil career in 1923 as roustabout and tool dresser with the Carter Oil Company in Wyoming. Two years later, he resigned to join an affiliate of Standard Oil Company (New Jersey) in Argentina. There he served successively as inventory man, production foreman, and district superintendent in the San Pedro oilfields.

Joining the Stanvac organization in Indonesia in 1937, Davis was named assistant field superintendent in the Pendopo producing area of South Sumatra. During the war years of 1942 to 1945, he was employed by Creole Petroleum Corporation as assistant division engineer at Maracaibo, Venezuela.

With the exception of a two-year assignment in Indonesia, Davis' postwar service with Stanvac, 1945-1954, has been in the New York office. He was named assistant manager of the Producing Department in 1949 and has been acting department manager for the past year.

•

H. M. HERRING, drilling superintendent for SARM, with headquarters at Piacenza, in Italy's Po valley has returned with his family to Italy after a brief visit with relatives in Texas. Herring has been with SARM, drilling contracting firm for Azienda Generale Italiana Petroli, for four years.



WILDCATS DRILLED IN SECHURA DESERT

Interest Moves From Peru's Sechura to Eastern Montaña

Coastal exploration continuing despite disappointments. Nation's crude production up 9.2 percent in 1954 without discovery of new oil fields.

By DR. J. E. RASSMUSS, Consulting Geologist, Lima, Peru

INTEREST OF OIL companies in South America has been focused lately on Peru, where free economy, free exchange and the new petroleum law offer significant incentives for foreign investments. In Venezuela, the long-expected release of the suspension on granting new concessions has not yet been realized, and Venezuela's total concession area of 15.4 million acres is now less than Peru's total of about 21 million acres.

In Colombia, the high barrier of the different Andes ranges presents serious obstacles to development, and high taxation—up to 64 percent—further increases expenses. Exploration on the Pacific coast has not been successful so far, and the Richmond Oil Company wildcat at Buchado, 36 miles from the coast in Chocó department, was abandoned at 15,539 feet on July 27.

In Argentina, Chile and Bolivia, where state monopolies exist, a more friendly attitude toward foreign oil development has been taken recently. Argentina has entered discussions with Atlas Corporation and Dresser Industries, Inc., for financing development in the Neuquen area, where crude reserves of 60-70 million barrels have been proved. Chile is considering the opening of undeveloped areas, and Bolivia already has granted two concessions to foreign operators.

In Brazil, where oil imports mean the heaviest burden for the trade and dollar balance, a change of oil policies may be expected by past political events.

Although no new fields have been discovered in Peru, crude production rose 9.2 percent in the first half of 1954 as compared with the same period the previous year. For the 1954 period, the total reached 8,573,195 barrels, and for the like period in 1953 the total was 7,853,635 barrels. Daily average yield was 47,366 barrels in the first six months of 1954 as compared to 43,390 barrels for the previous year's first half.

By adding about 3100 barrels a day of natural gasoline from International Petroleum Company, Ltd.'s field and 500 barrels a day from Compania Petrolera Lobitos' El Alto and Lobitos fields, daily average production for the first half of 1954 amounted to about 51,000 barrels daily of crude and condensate.

Production of the Lobitos fields includes the joint operation areas operated by International Petroleum and shared 50-50 by it and Compania Petrolera Lobitos. These areas, located in the boundary zone of Lobitos Company and between Lobitos and El Alto fields produced about a third of the total Lobitos concessions output, and amounted to 160,385 barrels in June.

Production of International Petroleum's Brea-Pariñas field of 5,192,417 barrels during the first half of this year was similar to the preceding

TABLE 1
Peru's Crude Production for June

FIELDS	Barrels
International's Brea-Parinas..	873,671
Lobitos.....	472,483
Empresa Petrolera Fiscal.....	49,678
Ganso Azul.....	27,787

year's total of 10,422,806 barrels for the entire 12 months. However, Lobitos area yield rose about 20 percent to 2,927,331 barrels.

EPF production is more or less stabilized at about 50,000 barrels monthly, or 1600-1700 barrels a day. Ganso Azul's output has risen to about 1000 barrels daily, depending upon storage and transport facilities, but its potential is considerably higher.

During the first six months of 1954, 31 rigs were operating in Peru—20 rotary and 11 cable tool rigs. One hundred twenty-one wells have been completed, of which 87 were producing and 34 were dry. Footage drilled in the first half of 1954 totaled 315,787 feet in the coastal area.

Total number of producing wells at the end of June was 1905 oil wells and 10 gas wells of International Petroleum, 1251 wells in Lobitos field, 2 EPF gas wells and 98 EPF oil wells, and 10 wells in Ganso Azul, giving a total of 3264 oil and 12 gas wells but including a large number of old stripper wells in Brea and Pariñas and in EPF's Zorritos field. The latter is the oldest field in South America, having been discovered in 1865.

Exploration has been active in three areas: Sechura desert, where 10 companies hold 4.1 million acres of concessions; in the northern coastal region, east and north of the producing fields, where two American companies — Peruvian Pacific Petroleum Company and Amotape Company — have leased about 500,000 acres from EPF; and in eastern Peru's Montaña, where almost 17 million acres are held under concessions by nine oil companies.

Table 2 includes all wildcats drilled in Sechura except a 1953 effort by International Petroleum, Viru 4, which was spudded in on Aug. 18 and abandoned in the basement at 7330 feet on Nov. 26, 1953.

All Sechura wildcats were failures. In the northern part, basement was found in shallow depths, ranging around 3000-3500 feet and uplifting in Paita 1 to 1282 feet. This uplift indicates a Tertiary submarine swell, which joined the Amotape mountains and the Silla de Paita, both composed of older rocks and constituting islands in the Tertiary sea.

The deepest Sechura wildcat, Viru 5, reached 8063 feet, but no complete development of the lower Eocene sequence, which contains the source beds in the producing fields, has been discovered so far.

Quaternary and Upper Tertiary marine deposits reach considerable thickness and further drilling and research must disclose whether Sechura desert constitutes only a shallow basin filled principally with younger accumulations and separated from the Tertiary ocean, on whose shelf the oilbearing Eocene beds were deposited on the northern coast by a range of Tertiary islands as the Silla de Paita and Corros Illesca, joined by submarine swells and forming a different embayment.

In the northern coastal area in EPF's concession, three wildcats have been drilled by Peruvian Pacific Petroleum Company, a subsidiary of Cities Service Oil Company and Richfield Oil Corporation, located east of Lobitos Company's El Alto field and EPF's Organos field.

In Sechura, locations for three test wells have been selected by four companies: the national company Petrolera Peruana, Union Oil (north), International-Sea Oil (south). Peruvian Pacific is preparing a new location in the Collonitas area north of Brea-Pariñas concession.

In Southern Peru's Pisco-Nazca region, where prospects are poor, Peruvian Oils and Minerals has abandoned a part of its concessions. Only Sea Oil currently holds considerable acreage there.

Following disappointing results in the coastal area, interest has increased in the eastern Montaña. Exploration has been intensified in that densely-forested jungle country.

For the first time, European companies have entered Peru following enactment of the new oil law. Anglo Saxon Petroleum Co. has been granted a permit for geological and geophysical surveys in the southern Montaña. A group of German producers—Deutsche Erdoel, Wintershall and Elwerath—is preparing to drill a wildcat east of the Ucayali river in association with Peruvian Compañia El Oriente.

LeTourneau, Inc., of Peru, subsidiary of the U. S. equipment manufacturer, holds a million-acre land concession in the Montaña and has applied for oil concessions south and north of Ganso Azul.

Among American companies, Socony Vacuum Oil Company and Texas Petroleum Company have be-

TABLE 2
Wildcats Drilled in Sechura Desert During 1954

OPERATOR	Well	Spudded	Completed	Depth (Feet)	Formation
NORTHERN SECHURA					
Union Oil Co.	Paita 1	Jan. 7	Jan. 22	1282	Basement
Union Oil Co.	Piura 1	April 21	May 6	3500	Basement
Union Oil Co.	Piura 2	May 13	May 21	1778	Basement
Union Oil Co.	Paita 2	May 30	June 27	3528	Basement
Union Oil Co.	Paita 3	July 4	July 27	3419	Basement
Union Oil Co.	Huaca	July 29	Drilling	3102	
MIDDLE SECHURA					
International-Sea Oil, Ltd.	Expectativa 1	Mar. 3	April 3	5684	Basement
International	Viru 5	May 22	July 18	8063	Basement
SOUTHERN SECHURA					
Richmond	Inca 5	Nov. 12, (1953)	Feb. 13	5994	Cretaceous slate
Richmond	Minchales	Mar. 16	April 2	5792	Igneous
International-Sea Oil	Venturosa 9	Aug. 8	Aug. 25	5270	Basement

TABLE 3
EPF's Concession Area Wildcats

WELL	Spudded	Completed	Depth	Result
D 1	Nov. 16, 1953	May 24, 1954	7027	Producing
D 2	Jan. 28, 1954	Suspended	....	.....
D 4	July 5, 1954	Drilling	3875	Found Oil

COUNTERBALANCED

LeBUS GROOVING & COUNTERBALANCE CONTROL PYRAMID SPOOLING SYSTEM*

Sometimes the "Balancing" of Ledger books can be a problem. But the "Counterbalancing" of hoisting rig drums was no problem to LeBus Engineers. With years of experience behind them, LeBus Engineers developed their "Three-Point" System of GROOVING & COUNTERBALANCE CONTROL PYRAMID SPOOLING SYSTEM to a point where they have practically eliminated all vibration with respect to Wire Line Spooling.

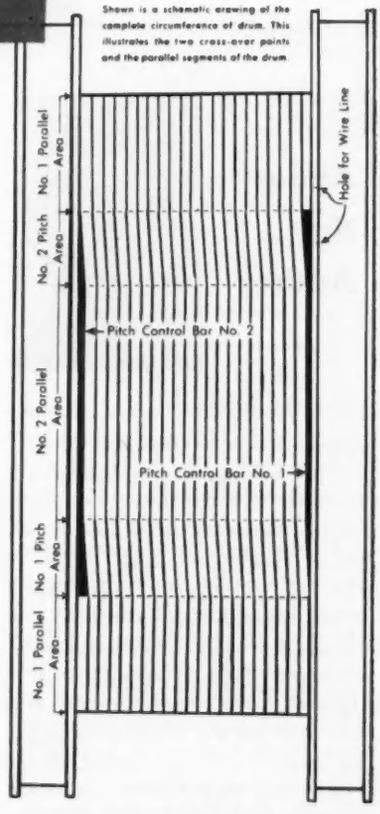
Not only has vibration been reduced to a minimum but LeBus has also practically done away with Wire Line cutting-in, scrubbing, pinching, or squeezing, plus wire line whip. Each highly destructive to wire line. With the LeBus System the drums will spool much smoother at slower or at faster speeds.

Thousands of operators are using LeBus Grooving with great satisfaction – *SAVINGS!*

See What LeBus GROOVING WILL DO FOR YOUR RIG.

Consult a LeBus Engineer today.

*Patented and Other Patents Pending


Shown is a schematic drawing of the complete circumference of drum. This illustrates the two cross-over points and the parallel segments of the drum.
No. 1 Parallel Area
No. 2 Pitch Area
No. 2 Parallel Area
No. 1 Pitch Area
No. 1 Parallel Area
Hole for Wire Line
Pitch Control Bar No. 2
Pitch Control Bar No. 1

LeBus International Engineers, Ltd.

Executive Offices: 305 Wichita National Bank Building, WICHITA FALLS, TEXAS
Sales, Service Control and Warehouse Stock: LONGVIEW, TEXAS

gun or are preparing to conduct extensive geophysical surveys of their big holdings.

Most active has been the new Ganso Azul Company, which has completed six new wells in its field and was drilling the seventh. Five wells out of six have been producers, the last two yielding about 700 barrels per day each. Exploration wells are prepared with a second rig on the Chonta dome, south of Ganso Azul dome, and on the Santa Clara dome farther north.

Oil from Peru's Montaña will first supply demands of neighboring Brazil, whose only oil shows have been in the Nova Olinda well. Because of its high grade (42-43 gravity) and economic river transportation, Peruvian crude can compete favorably with Brazil's imports from Venezuela in the Amazon basin. But if major companies' development work is successful, construction of a pipe line to the Pacific seems assured.

—**The End**

New Oil Structure in Taiwan

Continued from Page 258

keng, a higher culmination on the Chutung anticlinical trend. Unfortunately, steep dips were encountered just above the target horizon, and further operations were suspended in the area pending restudy.

After a check geological survey in the Chutauchi area, the new extension location was selected, with the result mentioned earlier. During this time also, resurveys of several other prospects have been undertaken in preparation for further test drilling. The result at Chutauchi should provide incentive for a considerable increase in activity with the object of reducing Taiwan's dependence on crude imports.

—**The End**

About the Author

LEO. W. STACH is an Australian technical consultant for petroleum and natural gas development in the Far East. He published his first paleontological paper at the age of 17. After graduating with an M.S. degree from Melbourne University in 1936, he went to Papua as a field geologist with Australasian Petroleum Company and spent his first year on the original geological survey of the area where that company's Omati test well recently encountered high-pressure gas. During World War II, Stach was a civilian consultant to Gen. Hugh J. Casey's Engineer headquarters in the Southwest Pacific. After the war he was appointed to the Petroleum Branch of the Natural Resources section of Gen. Douglas MacArthur's headquarters in Tokyo. He was responsible for the administration of Japan's petroleum and natural gas producing industry until 1951. Since that time he has been engaged in independent consulting with Japanese companies and with Chinese Petroleum Corporation in Taiwan. He is a well-known contributor to oil periodicals and recently rewrote the revised section on the geology of Japan for the Encyclopedia Britannica. He is a member of the Geological Society of America, American Association of Petroleum Geologists, American Geophysical Union, Society of Economic Paleontologists and Mineralogists, Institute of Petroleum (London), Royal Microscopical Society of London, Royal Society of Victoria, Geological Society of the Philippines, Geological Society of Japan, and Paleontological Society of Japan.

Oil in Australia

Continued from Page 264

contains artesian water in its lower part. Oil is produced from the upper part of the sand from 36 wells over an area of 3 miles by 1.5 miles at a rate of about 200 barrels from all wells per year.

It appears that the oil is a residual oil which has lost its higher constituents by slow leakage through the imperfectly sealing cap rock. Oxydation and polymerization through contact with fresh water is also likely to have occurred.

There is an increase in thickness westward from Lakes Entrance to Lake Victoria. If geophysical methods, gravity and, later, seismic, should prove a further deepening of the basin westward and the presence of structures or buried pre-Tertiary ridges could be established, chances would undoubtedly be better than in the rather shallow Lakes Entrance area. Tertiary overlaps on such buried hills would then be quite likely.

Therefore, investigation of possibilities of a deepening basin in a western direction is logical.

Conclusions. It is well known that an area of major size can lie dormant or attract only mild interest over a long period, until a discovery touches off a chain reaction. This reaction invariably affects much wider areas than are actually proved by the discovery. Consequently, areas which have been condemned previously or were given a low prospective rating, are suddenly reconsidered.

This has been done, not because prospects of certain areas warrant special enthusiasm but because psychologic atmosphere after such a discovery is favorable for testing marginal prospect areas. The regional aspect of the problem of oil-finding in Australia is also stressed, because, in the author's opinion, it is only too often neglected.

A discussion of Western Australian basins should demonstrate that notwithstanding an early and spectacular success in a completely virgin area, there still lies a long road ahead until Australia will qualify as an oil-producing country.

REFERENCES

A comprehensive list of publications is to be found in the Bulletin of AAPG, Vol. 35, No. 12, pp. 2523-25.

—**The End**

19 of 24 ENGINE MANUFACTURERS

Apply

ROCKFORD POWER TAKE-OFFS

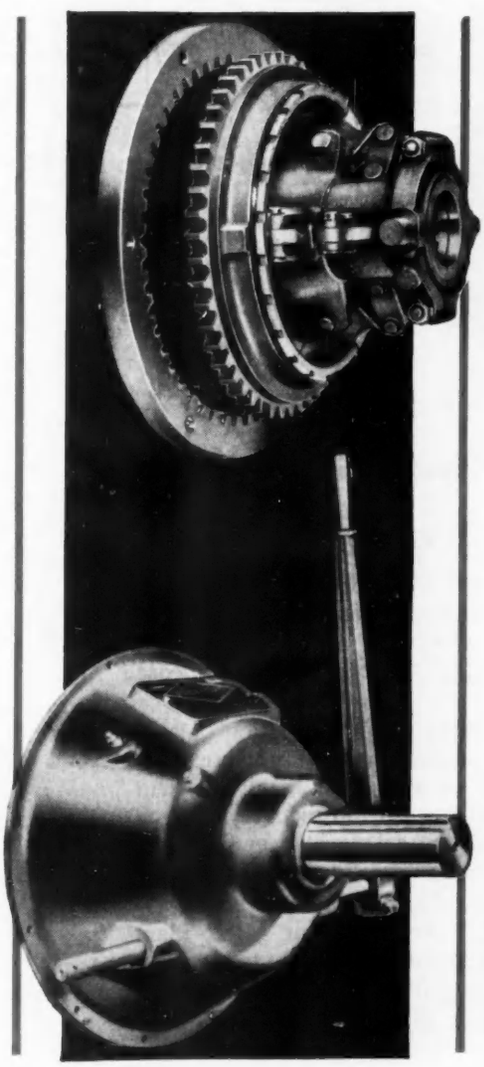
As Original Equipment on

THEIR OIL FIELD ENGINES

BECAUSE of their adaptability to heavy-duty, oil field service, ROCKFORD POWER TAKE-OFFS are used by 19 out of 24 engine manufacturers selling to oil producers. Gear-tooth drive — convenience of adjustment — and trouble-free operation make these low-cost Power Take-Offs best suited for the shock loads and constant pounding of oil field use. Capacities range from 125 to 2100 foot pounds torque. Sizes fit standard S.A.E. flywheel housings. It will pay you to specify "ROCKFORD" when ordering your next engine or equipment.

Send for This Handy Bulletin

Shows typical Installations of ROCKFORD CLUTCHES and POWER TAKE-OFFS. Contains Diagrams of unique applications. Furnishes capacity tables, dimensions and complete specifications.



These ROCKFORD DISTRIBUTORS and DEALERS carry a stock of clutches, power take-offs and replacement parts to insure ROCKFORD clutch users prompt delivery and service.

Continental Sales & Service Company, Los Angeles, Calif.
Lightbourn Equipment Company, Dallas, Texas
Atlas Auto Parts & Grinding Co., Louisville, Kentucky
Wepco Equipment Company, Cleveland, Ohio
Genuine Motor Parts, Pittsburg, Pa.
Auto Clutch & Parts Company, Chicago, Illinois
Auto Gear & Parts Company, Philadelphia, Pa.
General Machine Parts, New York, N. Y.
Highway & Industrial Equipment Co., Inc. Raleigh, N. Carolina
R. Angus (Alberta) Ltd., Edmonton, Alberta, Canada
Moose Equipment Co., Ltd. Montreal, Canada
Quebec City Gas & Diesel Engine Ltd. Quebec City, Canada
B-W-H Service Parts, Ltd., Merritton, Ontario, Canada
Credle Equipment Company Utica, New York
Engine Service & Supply Company Odessa, Texas
National Supply Engine Corp. Portland, Ore. and Seattle, Wash.

Wherever industry uses heavy duty clutches or power take-offs there is a ROCKFORD distributor conveniently close at hand to supply ROCKFORD Heavy Duty CLUTCHES, POWER TAKE-OFFS and replacement PARTS for numerous types and sizes of each.

ROCKFORD CLUTCH DIVISION

Borg-Warner - 1323 Eighteenth Ave., Rockford, Illinois

Cuban Discovery

Continued from Page 266

play is due for the island during the next year or so.

Shortly after the Jatibonico discovery, Deep Rock Oil Corporation and Sterling Oil Company of Oklahoma leased more than 5 million acres and plan a number of tests following extensive geological and geophysical work.

Another newcomer to the Cuban scene is the Cuban-Colombian Petroleum Co. This group consists of American and Cuban businessmen, including John Roosevelt, son of the late president, Joseph W. Frazer, former president and chairman of the board, Kaiser-Frazer Corporation. Octavio Reyes Espindola, one-time Mexican ambassador to Cuba, is president, and Eduardo Greñas, prominent Latin-American business man of Havana, is executive vice-president of the company. Plans call for the drilling of at least four wells on the company's more than 800,000 acres of concessions, part of which adjoin the Jatibonico discovery.

Other operators reported acquiring acreage and planning drilling campaigns in Cuba include American Le Duc Petroleum, a Canadian firm which acquired nearly 5 million acres extending through the provinces of Matanzas, Havana, Las Villas, Piña del Rey and Camaguey; American Oil Company, partly owned by the Grady Vaughn-Herbert W. Klein interests of Dallas; Ted Jones of Los Angeles. About a dozen other deals are also reported in the making.

—**The End**

Russians Await Reply From Arab League

A secret meeting of the Arabian League reportedly has just been held in Cairo, Egypt, to discuss the possibility of getting Arabian countries to adopt indentical oil policies. According to the reports, the Russian military attache in Egypt has informed representatives of Arabian countries that should they be ready to fight Western intervention in the petroleum industry in their territories the Moscow Government is ready to cease supplying oil and petroleum products to Israel. The Executive Committee of the Arabian League has informed the Russian representative that they are to consider the Russian proposal. A reply was to have been given in October.

American Leduc Buys Half of Cuban Field

The Cuban Canadian Petroleum Company of Cuba, a wholly-owned subsidiary of American Leduc Petroleum Company, Ltd., of Edmonton, Alberta, has bought 50 percent interest on a checkerboard basis in the Echeverria field, first commercially productive oil field in Cuba.

Rights covering 15,000 acres were acquired from Petroleria Jatabonico, original grantees of the concession in Camaguey Province.

The Cuban Canadian acquisition is an offset to 15,000 acres bought earlier from Petroleria Jatabonico by Corporation Generale Petrolio de Cuba, in which Kerr-McGee Oil Industries, Inc., has 25 percent interest. Two wells, Echeverria 1 and

STOP

giving away your liquids!

Install a Russco Micro-Plant or Super-Knockout

NOW you can hike profits on your gas distillate wells — large or small — with Russco's miniature gasoline plants. Designed to solve your particular problems, the Micro-Plant and Super-Knockout installations are fully automatic . . . require minimum operating attention . . . and can be economically moved from one lease to another.

These miniature absorption and extraction plants operate at either high, medium, or low pressure. Depending on the nature of your well, their highly efficient multi-fractionation processes furnish top recovery of such materials as propane, butane, gasoline . . . and at the same time accomplish dehydration.

Whatever your present production, the Russco Super-Knockout (Low-Temperature Processer) or Micro-Plant (Larger Unit) will step up recovery enough to pay out quickly and give you an excellent profit increase.

For complete service, from design to operation, write or call —

REC **RUSSELL ENGINEERING COMPANY**

2609 Sunset Boulevard Houston, Texas MAdison 4423

2 have been brought into commercial production. Drilling operations have begun on Echeverria 3.

The 30,000 acres now halved between Cuban Canadian and Corporation Generale Petrolio de Cuba were originally the Echeverria discovery known as Dos Estrellas.

Cuban Canadian has moved into Cuba on a major exploration scale. On August 23 it was announced that the company had taken a 30-year oil lease on 4,992,700 acres spotted in five provinces across the island. A significant part of the acreage involves tideland rights.

Stanvac and Pakistan Sign Exploration Pact

The Government of Pakistan and Standard-Vacuum Oil Company have signed an agreement under terms of which they will join in searching for crude reserves in a 20,000 square mile area—10,000 in East Pakistan and 10,000 in West Pakistan.

The Pakistan Government will share in the risks of the search through a 25 percent participation in the costs of exploration, the oil company providing the other 75 percent. On this basis the government has agreed to invest funds as required up to a maximum of $15 million.

Areas to be explored are located in the Ganges River delta area of East Pakistan and in the Indus River valley of West Pakistan. A preliminary study of the former area was made about 2½ years ago by Stanvac by means of an airborne magnetometer survey. Arrangements were already under way to commence detailed geological and geophysical examinations.

New Gas Structure In Po Valley Discovered

Continuing oil and gas research in Italy's Po Valley has resulted in the recent discovery of a gas structure at a depth of 5413 feet at Reggio Emilia in Cremona province. At Fosdondo and Canolo di Correggio, in Reggio Emilia province, deep drilling is scheduled to begin.

Currently, in Reggio Emilia province, 14 gas wells are producing dry gas from a depth of 3772 feet. Capacity of these wells is rated at 42.3 Mmcf. daily each; however, only 28.2 Mmcf. currently is being used. The gas is transported to market through the Cortemaggiore-Bologna gas pipe line connecting the field with Masone.

Also, in Fosfondo and Canolo regions, 9800-foot rigs are scheduled to test oil structures.

In Sicily, success of its first well in the Ragusa field has led Gulf Oil Corporation to extend its research activity over approximately 2½ million acres. Sicily reports indicate that the discovery well, Ragusa 1, is producing at a rate of about 850 barrels per day.

Russia Claims Crude Quota Is Fulfilled

Russia's Ministry of the Oil Industry fulfilled its production quota by 101 percent during the first half of 1954, according to the official newspaper *Pravda*.

Crude production for the six months reportedly was 10 percent higher than in the same 1953 period. Gasoline production gained 9 percent, diesel fuel 40 percent and natural gas 12 percent.

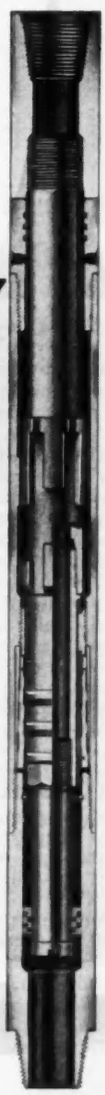
BOWEN *presents a tremendous advancement in Rotary Jar construction*

SEALED LUBRICATION
— practically eliminates wear
— greatly reduces servicing
— assures constant tripping tonnage

NOTHING PROTECTS METAL SURFACES LIKE AN *OIL BATH*

The tripping mechanisms in Sealed Type "I" BOWEN ROTARY JARS are identical with those in the earlier types of Bowen Jars that have performed successfully the world over under all types of conditions for many years. These new Jars differ in that they are filled with oil and sealed top and bottom against the ingress of well fluid. With this arrangement, the moving parts of SEALED TYPE "I" BOWEN ROTARY JARS work in a bath of oil.

SEALED TYPE "I" BOWEN ROTARY JARS are installed in fishing strings to enable the operator to strike heavy upward blows against an obstinate fish and knock it loose. They are also installed as safety devices in strings during testing, coring, reaming, drilling, side tracking and washing-over operations. Their presence insures the operator of the ability to knock the string loose should it stick.



Outstanding Advantages

SEALED TYPE "I" BOWEN ROTARY JARS are straight pull mechanical type Rotary Jars which provide greater efficiency in operations. They:
— Prevent accidental release of the fishing tools below the Jar
— Operate successfully under all conditions
— Deliver the same heavy upward blow regardless of the rate at which the string is elevated
— Feature oversize circulation holes which permit use of wire line tools and allow passage of large fluid volumes

Write for descriptive literature

SEALED TYPE "I" BOWEN ROTARY JARS

SR BOWEN CO

MAIN OFFICE AND PLANT:
11008 SOUTH NORWALK BOULEVARD
SANTA FE SPRINGS, CALIFORNIA
EXPORT OFFICE:
30 ROCKEFELLER PLAZA
NEW YORK CITY, NEW YORK
EXPORT REPRESENTATIVE: VAL R. WITTICH JR.

(For more data on advertised products, use Readers' Service blue cards, last page this issue.)

What's Happening

AMONG MEN IN THE INDUSTRY

F. E. Smith

G. F. Bish

G. F. Poe

E. B. Stewart

J. D. Anderson

I. G. Burrell

O. V. Henry

J. A. Grimes

J. S. Leonard

R. E. McMillen

The Ohio Oil Company has realigned top executive responsibilities in its Production department. The assignment of manager of the department, which **W. B. Emery** carried out in addition to his responsibilities as a director and vice president, has been made into a separate position. Emery will give full attention to the company's exploration and production program. Emery will be director and vice president of production and **F. E. Smith,** assistant manager of production, has been appointed manager of production and elected a vice president. **G. F. Bish,** division manager at Tulsa, and **G. F. Poe,** general superintendent of production, have been appointed assistant managers of production with headquarters at the general office in Findlay. **E. B. Stewart,** division manager at Terre Haute, Ind., succeeds Bish as manager of the Tulsa division and **J. D. Anderson,** assistant division manager at Houston, moves to Terre Haute as division manager. **I. G. Burrell,** assistant to the manager of production at Findlay, has been appointed assistant division manager of the Houston division; **O. V. Henry,** division superintendent of production at Houston, succeeds Poe as general superintendent of production in the general office; and **J. A. Grimes, Jr.,** assistant Houston division superintendent of production, advances to division superintendent succeeding Henry.

•

L. S. Leonard, manager of **The Ohio Oil Company's** Sidney, Neb., production district since 1953, has been promoted to assistant manager of the Casper, Wyo., Production division. Leonard succeeds **R. W. McCanne,** who advanced to division manager upon the retirement of **H. H. Healy. R. E. McMillen,** assistant to the general superintendent of the Production department, Findlay, will replace Leonard at Sidney. Leonard's first job with Ohio Oil was a foreign assignment as junior geologist in Mexico in 1930. He advanced to production superintendent for Ohio Oil in Mexico and later was transferred to posts in New Mexico and Texas as district petroleum engineer. Since 1945 Leonard has been superintendent of Ross Ranch Field, Knox City, Texas; rotary drilling foreman at Reed City, Mich.; and drilling superintendent in Houston. McMillen started with the company in 1941 in Michigan and advanced to district petroleum engineer, division petroleum engineer, and assistant to the general superintendent of production in Findlay.

•

M. M. Mulholland, district geologist for **The Carter Oil Company** at Grand Rapids, Mich., has been promoted to assistant division geologist at Mattoon, Ill.

•

C. M. Foster, assistant zone superintendent of production for **Gulf Oil Corporation** at Odessa, Texas, has been transferred to Wichita Falls, Texas.

•

Don Allen, geologist with **Westgate Oil Company** of Wichita, Kansas, has resigned to become a consultant in Kansas. Formerly he was district geologist for the Westgate-Greenland Oil Company and has been associated with Westgate Oil since 1953.

•

Roger C. Hamil, Jr., has been elected a vice president of the Victoria Bank & Trust Company in Victoria, Texas, and will head the new Oil and Gas department. Formerly Hamil was with Humble Oil & Refining Company, having served as a roughneck, then in Humble's Houston laboratories, and in the Southwest Texas division in Houston and Louisiana. Before accepting the banking position, Hamil was district petroleum engineer for Humble at Brookhaven, Miss.

•

Standard Oil Company of California has appointed **E. J. McClanahan** as vice president and director of western operations. In this capacity McClanahan will have responsibility for operations of the company in the seven western states, Alaska and Hawaii.

•

Robert C. McCain has joined **Lion Oil Company** as geologist in the Casper, Wyo. district office. McCain was born in Dermott, Ark., and, after serving two years in the Navy, attended Colorado School of Mines where he was graduated in 1949 with a degree in geological engineering. Prior to his employment by Lion, McCain was a geologist with K. D. Owen in the Rocky Mountain area.

•

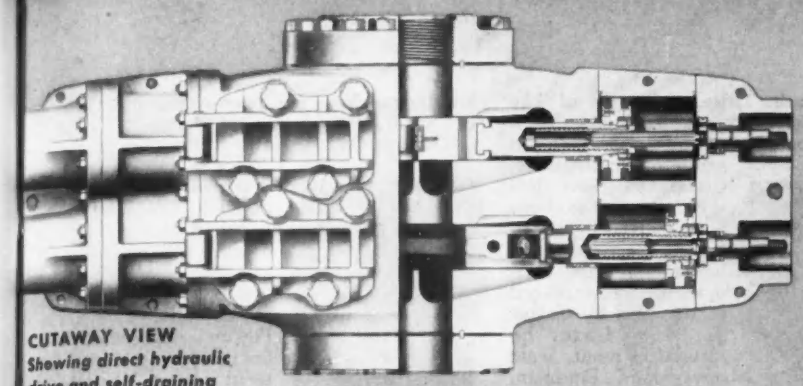
Paul Schultz of Cushing, Okla., has been elected president of **Blackwell Oil and Gas Company,** succeeding **Tom Berry** of Stillwater, Okla. Named to the company's board of directors were **Mrs. Ralph Johnson** and **A. C. Adams** of Cleveland; **W. M. Vickery, Mrs. Ola Goodson** and **Mrs. R. C. Jones** of Blackwell; **Mrs. E. J. Blank, C. T. Stout, Robert C. Jones** and **A. B. Immell** of Cushing; **Theron Worth** of Houston, and Berry.

•

Melvin G. Oxsen has joined the staff of **Lion Oil Company's** production and exploration district office in Denver as a geologist trainee.

•

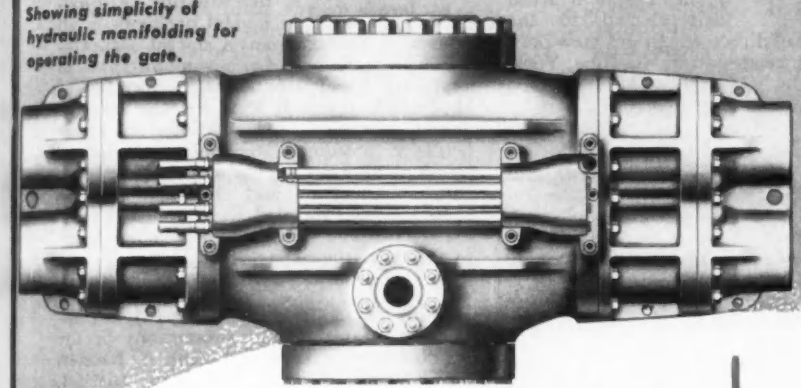
Merton E. (Doc) Austin of Mt. Pleasant has been promoted to division superintendent of the Operating department for **Sun Oil Company's** Michigan Production division. Austin has been division petroleum engineer at Mt. Pleasant. He succeeds the late **Clarence F. Knollenberg,** also of Mt. Pleasant, who died September 12 after 35 years service with the company. **William B. Inglis** will continue to serve as assistant division superintendent of the Operating department at Mt. Pleasant. **George E. Haas** will succeed Austin as division petroleum engineer. **Harold E. Rudel** has been appointed division manager of the Land department.



CUTAWAY VIEW
Showing direct hydraulic drive and self-draining ram compartments.

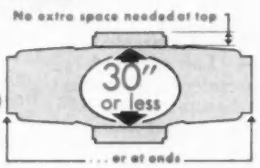
any way you judge SHAFFER HYDRAULIC CELLAR CONTROL GATES Are Unsurpassed

REAR VIEW
Showing simplicity of hydraulic manifolding for operating the gate.



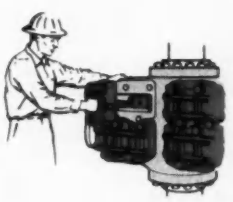
Naturally, *Safety* is the top consideration in selecting any cellar control gate equipment, and Shaffer equipment is backed by well over a quarter-century of experience and dependability in the field of pressure control. But, in addition to safety, Shaffer tops the industry in other important advantages, too. For example —

do you want Compactness?



WITH SHAFFER Hydraulic Cellar Control Gates you not only get unusual compactness–in height, width, length–but equally important, you don't have to allow extra space above them for changing rams – nor do you have to allow extra space at both ends of gate for expanding the unit to remove and replace rams.

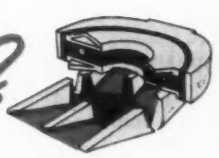
Rams in Shaffer Hydraulic Gates are quickly changed through patented side-opening doors. Simply unbolt and swing open the door . . . change rams . . . and bolt the door shut again. Closing the door automatically aligns the rams within the gate. Even in sizes as large as 13⅜" (12" Series 900) the gate is only 30" high – and this is total required height – no extra space need be allowed for servicing the rams!



do you want Convenience?

WITH SHAFFER Hydraulic Gates there's no need to dismantle the upper compartment in order to change rams in the lower compartment. You can change rams in either compartment without in any way disturbing or disconnecting the other. Each is completely independent of the other – a valuable safety, as well as time-saving, feature!

do you want Advanced Design?



WITH SHAFFER you get *field-proven* design that has been proven superior under widely-varying types of operations and field conditions. Such advancements as: SELF-DRAINING COMPARTMENT BOTTOMS (no detrimental mud and sand accumulations to interfere with operation of the rams) . . . DIRECT HYDRAULIC DRIVE (no yokes or secondary connections to fail) . . . COMPLETELY ENCLOSED DESIGN (no exposed moving parts to jam or corrode) . . . these and other important advancements are yours for added protection when you specify SHAFFER!

Get ALL the facts on Shaffer Cellar Control Gates before you buy any pressure protection equipment. Compare Shaffer superiority, point-by-point!

do you want Versatility?

WITH SHAFFER – and only with Shaffer – do you get a choice of either Single or Double Hydraulic Gates–whichever best meets your requirements. Rams and most other parts are interchangeable, size for size. Single and Double Gates assure you of maximum adaptability for your particular needs – at minimum inventory and maintenance costs.

Write direct for full details — or see your nearest Shaffer representative.

Send for your free copy of the latest Shaffer Catalog!

See the Shaffer Section of your Composite Catalog.

31 years OF OIL TOOL LEADERSHIP

SHAFFER

HIGH PRESSURE DRILLING AND CONTROL EQUIPMENT • FISHING TOOLS THAT EXC

SHAFFER TOOL WORKS, Brea, California • California Service Shops: Santa Fe Springs and T
HOUSTON, TEXAS, 6006 Navigation Blvd. • ODESSA, TEXAS, 1925 West Second Street
OKLAHOMA CITY, OKLAHOMA, Acme Oil Tool Company, 1001 S. E. 29th STREET
FARMINGTON, NEW MEXICO, Shaffer Tool Works, Post Office Box 546
CASPER, WYOMING, Shaffer Tool Works, Post Office Box 1788
EXPORT SALES OFFICE: Shaffer Tool Works, 500 Fifth Avenue, New York, N. Y., U.S.A.

PERFORATE TUBING IN THE WELL

KINLEY TUBING PERFORATOR

M. M. Kinley Company Licensees

ABILENE, TEXAS
Hudson-Eads, Inc. 2-5331
BEAUMONT
Associated Engineers, Inc. ..... 5-7046, ZF 8-2023
CASPER
C. A. White 3-5264
CORPUS CHRISTI
Tubokut Wireline Services 5-1811
Tuboscope 3-3512, 4-3137
HOBBS
Cecil Horne 3-5396
HOUSTON
Tuboscope JU-0577, MO-4279
KILGORE
Tuboscope 5193, 6403, 5218
MIDLAND
Lucous 4-8471, 4-4320
NEW IBERIA
Tuboscope 2-3831, 4-1327
NEW ORLEANS
Associated Engineers, Inc. AU-7696
OKLAHOMA CITY
Rainbo Service Co. ..... ME 4-2131, ME 2-2024
SHREVEPORT
Tuboscope 8-2336
WICHITA FALLS
Hudson-Eads, Inc. 2-3767, 2-8584, 3-4690

Nelson Y. Ruth, Tulsa, a director of **The Carter Oil Company**, has become assistant coordinator of the producing-coordination group of Standard Oil Company (New Jersey). Ruth has been with Carter 27 years, having been a member of the first seismograph crew placed in the field by Carter in 1931. Later he served as scout, lease buyer and landman, division landman, manager of the Land department and head of Exploration department. In 1953 Ruth was elected to the Carter board of directors. In his new post, he will have headquarters in New York.

Nelson Y. Ruth

•

Richard L. Saunders, vice president and director of **The Texas Company**, has retired after 45 years with the company. Saunders joined Texaco in 1909 as a voucher clerk in the New York office. He held clerical and accounting jobs in Texaco Sales department before being made assistant to the general manager in 1929. Saunders was made manager of the Northern territory of the Sales department and was later appointed assistant general sales manager. He became secretary of The Texas Company in 1938 and was elected a vice president in 1944. Later Saunders was appointed vice president—domestic sales and was elected a director in 1946.

W. Jacque Yost has been appointed **Ohio Oil Company's** research director. Joining the staff of **W. H. Barlow**, manager of the company's Research department, Yost will manage Ohio Oil's projected research laboratory. He was formerly technical advisor to the director of research in Magnolia Petroleum Company's field research department, Dallas. The laboratory planned by Ohio Oil will conduct an integrated program of petroleum research, investigating technological problems in all phases of the company's operations. Major attention will be given initially to exploration and production. A member of Magnolia's research staff for the past 13 years, Yost led investigations in many fields of petroleum technology including physical analysis of hydrocarbon systems, catalyst structure, and electrical exploration. He later headed the applied mathematics section, giving theoretical guidance to the Research department.

W. Jacque Yost

•

Humble Oil & Refining Company has announced transfers and promotions in the Production department. **Macon A. Banner**, senior district clerk, Stratton District, Southwest Texas division, is promoted to assistant district chief clerk at the Colorado district; **George Dickens** has been transferred to the Anahuac district as toolpusher; **R. C. Barbour, Jr.**, transferred to the Athens District, East Texas division, as petroleum engineer; and **Billy W. Evans**, petroleum engineer, London district, East Texas division, transferred to Katy gas cycling plant as gas engineer.

•

American Republics Corporation has announced the promotion of **D. C. Collins** to division petroleum engineer, Eastern division, with headquarters in Silsbee; and the promotion of **Hugh F. Smith** to petroleum engineer for the Silsbee district, replacing Collins.

•

James W. Foley and **A. Neil Lilley**, vice presidents of **The Texas Company**, have been elected directors of the company. Foley joined the company in 1932 and has held a number of Engineering and Producing department positions. In 1950 he was named assistant to the chairman of the board and in 1953 was elected a vice president. Lilley, vice president—Foreign Operations department—Eastern Hemisphere, joined The Texas Company in 1933. He held various positions in the Sales department and in the Foreign Operations department, both in the United States and abroad, and was elected a vice president in 1951.

•

Mid-Continent Petroleum Corporation has announced the appointment of **Hayden Hughes** as assistant to the vice president—production. Hughes will assist **A. E. Pierce**, vice president, in the general administration of the Production department.

•

Marshall R. Joy, manager for the **Brazos Oil & Gas Company** in Mount Pleasant, Mich., has resigned to accept a position as manager of production for **Frankfort Oil Company** in Bartlesville, Okla. Formerly Joy was with Cities Service Oil Company and Toklan Production Company.

INSTALL
peak performance
INTO YOUR
compressors
(AIR • GAS • AMMONIA)

Peak performance, maximum efficiency, greater output, and lower power costs can be built into your oldest, and of course your newest, compressors by the installation of VOSS VALVES.

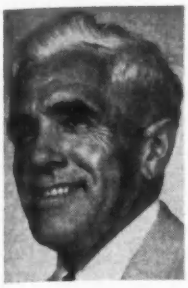
Check THESE VOSS VALVE ADVANTAGES:

- Quiet, vibration-free operation
- 20 to 60% more valve area
- less power consumption
- minimum pressure loss
- normal discharge temperature
- lower operating costs
- utmost safety

Our detailed proposal for increasing the efficiency of your compressor will be sent you without obligation. Send us the name, bore, stroke, and speed of your machine.

J. H. H. VOSS VALVES
REG. U.S. PAT. OFF.

VOSS VALVES / J. H. H. VOSS Co., Inc. 785 East 144th Street, New York 54, N. Y.



James K. Rogers

Joe J. Marty

Arkansas Fuel Oil Corporation has announced changes in the exploration organization of the San Antonio office. **Joe J. Marty** has been named division exploration manager. On his staff will be **John C. Bianchi,** district geologist; **A. V. Hargis,** district geophysicist; and **Francis E. Ruffin,** assistant district landman. **Dr. James K. Rogers** has been named regional research geologist in charge of geological research and special investigations for the company under the direction of **C. E. Cole,** chief geologist in Shreveport. In addition Dr. Rogers will act as advisor to the San Antonio district geological staff.

•

James W. Nance has resigned as chief geologist for **Pioneer Oil Corporation** and **Shannon Oil Company** to open an office as a geological consultant, in Denver. Prior to joining Pioneer Oil in 1951, Nance was associated with Standard Oil Company (N. J.) subsidiaries for 16 years, including eight years with Creole Petroleum Corporation in Venezuela and five years as senior geologist for The Carter Oil Company in the Rocky Mountain area.

•

Seaboard Oil Company, Dallas, has anappointed two new departmental general managers in the western operations of **Standard Oil Company of California. Fred Powell** has been named to head the Manufacturing department succeeding **O. N. Miller,** now a chairman of the company. **J. E. Gosline** takes over the Producing department, which previously operated directly under **J. E. Toussaint,** vice president. Powell was formerly president of California Research & Development Corporation, a Standard subsidiary which was dissolved earlier this year upon completion of its contracts with the Atomic Energy Commission. In the interim he has been serving as assistant manager of manufacturing with supervision over chemical production.

•

Seaboard Oil Company, Dallas has announced the establishment in Denver of Western division headquarters, consolidating division offices formerly maintained in Los Angeles and Casper. **N. A. Rousselot,** vice president and manager of the Western division will be in charge; other personnel include **A. W. Vitt,** manager of exploration; **H. H. Lawson,** manager of Land department; **C. R. Hocker,** manager of Title-Record department; **C. B. Kimberlin,** manager of production; **W. A. Russell,** accounting and tax advisor; **O. L. Beasley,** purchasing agent; **Fred Wade,** attorney. Tempoary offices are located in the Central Bank Building and permanent offices will be in the Denver Club Building upon its completion this fall. District offices will be maintained in Los Angeles, Billings, Mont., and Calgary, Alberta, Canada.

Your Best Insurance
AGAINST DRILLING FAILURES

Lime treated, oil emulsion muds, made with Marathon's calcium lignosulfonate* are being used extensively by many oil companies throughout the U. S. and foreign countries. These muds help insure against failure wherever difficult conditions such as deep slim holes, directional holes or abnormal pressures are anticipated or encountered.

To cite but one of many examples, in one well a 600′ salt overhang had been unexpectedly encountered at a depth of 8250′. The salt was drilled with a saturated salt water mud but attempts to drill through the shale below nearly stuck the drill pipe. After setting a 5½″ liner at 9372′ a lime treated, oil emulsion mud was prepared, using Marathon's calcium lignosulfonate as both dispersant and emulsifying agent. Drilling was continued with a 4⅝″ bit to a depth of 11,133′ where the well was successfully completed. Better than 1700′ of very slim hole were successfully drilled.

KEMBREAK† is a trade name for a neutral calcium lignosulfonate* made by Marathon Corporation, Rothschild, Wisconsin.

It is the only lignosulfonate product proved by years of successful use in oil well drilling.

*patented

KEMBREAK†
may be obtained from

MILWHITE MUD SALES CO.
HOUSTON, TEXAS

MAGNET COVE BARIUM CORP.
HOUSTON, TEXAS

†Reg. T.M., Accuracy Rig Tool Company

MARATHON *Corporation*
CHEMICAL DIVISION
ROTHSCHILD • WISCONSIN

(For more data on advertised products, use Readers' Service blue cards, last page this issue.)

Shell Oil Company has appointed **J. E. Clark** manager of the firm's Midland, Texas, exploration and production area to succeed **Joe T. Dickerson**, who is assuming the presidency of **Shell Pipe Line Corporation** with headquarters in Houston. Clark has been production manager of the Denver area since it was organized last January. Clark joined Shell's Production department at Long Beach, Calif., in 1933. He was promoted to division production foreman at Bakersfield in 1942 and returned to Long Beach in 1944 as division superintendent. Later he became senior engineer in the Los Angeles office of the Pacific Coast exploration and production area. He became manager of the Coastal division in 1948 and manager of the Rocky Mountain division in 1951, remaining in Casper, Wyo., until he took over the Denver post.

J. E. Clark

•

Joseph L. Seger has been elected executive vice president of **The Carter Oil Company** to succeed **M. A. Wright**, who assumes duties as coordinator of producing activities for Jersey Standard. Seger became a member of the Carter legal staff in 1933, becoming company secretary and remaining with Carter until 1946 when he was named general counsel for Interstate Oil Pipe Line Company, Shreveport, La. Seger became Interstate president in 1951 and returned to Carter in Tulsa as vice president and director. He still serves as a director of Insterstate and is a director of Yellowstone Pipe Line Company.

•

Benson M. (Benny) Kingston, inventor and technical author, who recently resigned as assistant manager and technical advisor of The Chemical Process Company, has opened petroleum engineering and geological consulting offices in Breckenridge, Texas.

•

Houston Oil Company of Texas has announced the promotion of **H. E. Treichler, Jr.**, to the position of assistant to the president. Treichler was associated with The Texas Company in its field operations until he joined the Houston Oil Company in 1950. Treichler is being succeeded as general superintendent of drilling and production for the company by **Barrett E. Booth**, formerly superintendent of the company's southwestern district at Beeville, Texas. **Ralph W. Brown**, formerly drilling foreman for the company, has been promoted to superintendent of the Southwestern District and will replace Booth at Beeville.

•

Gordon Fix, staff geologist at Mattoon, Ill. for **The Carter Oil Company**, has been transferred to Grand Rapids as assistant division geologist. **George Link** has been made assistant district superintendent at Carmi, and **John L. Dailey** is the new district engineer there. **Jack Simmons** has been made district engineer at St. Elmo and **F. M. Pierce** has resigned to become an independent geologist at Mattoon.

C. J. Hedlund, manager of the Coordination and Petroleum Economics department of **Standard Oil Company (New Jersey)**, has been elected to the board of directors of **Esso Shipping Company**, Jersey Standard's principal marine affiliate. Hedlund succeeds **J. A. Cogan**, who recently accepted an executive position with Imperial Oil Limited, Jersey's Canadian affiliate. Hedlund joined the Jersey organization in 1940 as a process engineer, later coming to New as assistant to the head of the Economics department and finally as head of the Petroleum Economics division. Earlier this year Hedlund was appointed manager of the Coordination and Petroleum Economics department.

C. J. Hedlund

•

Kenneth R. Boles has been named general manager of **Cimarron Drilling Company** and **Cimarron Western Drilling Company** of Tulsa. Boles succeeds **H. E. Rowe, Jr.** who has been appointed chief petroleum engineer and assistant manager of production of Bay Petroleum Corporation at Denver.

•

C. E. Greenwood, Corpus Christi, Texas, has been promoted to assistant to **Continental Oil Company's** southern regional geologist, with headquarters at Houston. He formerly was district geologist at Corpus Christi. **Harold L. Dubisson**, New Orleans, La., landman, has been promoted to district landman for Conoco, with headquarters at Lafayette, La. Greenwood joined Conoco in 1949 as a geologist at San Antonio and was promoted to district geologist at Corpus Christi in 1951. A native of Litchfield, Ill., he received his bachelor's degree in geology from the University of Illinois in 1949. Dubisson became associated with Conoco at Shreveport in 1951 and transferred to New Orleans early this year. He is a native of Gulfport, Miss., and received his bachelor's degree from Tulane University in 1951.

•

Dr. Robert Hendy Dodd has been appointed professor and head of the School of Chemical Engineering, Oklahoma Institute of Technology, Oklahoma A and M College, Stillwater, Okla.

•

Dr. Richard N. Meinert, associate chief of research at **The Carter Oil Company** research laboratory, Tulsa, has become associate coordinator of production research in the Producing Coordination department of Standard Oil Company (New Jersey). Dr. Meinert was graduated with a B.S. degree from Franklin and Marshall College, Lancaster, Penn., in 1927 and three years later received his doctorate from Northwestern University, Evanston, Ill. From 1930 to 1936, he was instructor at Brown University, Providence, R. I., and in 1936 went with Standard Oil Development Company at Bayway, N. J., as chemist. He remained with that company until 1947 when he was made assistant chief of research for Carter. He has served as chairman of the building committee which has directed construction of a new addition to the research laboratory in Tulsa, just now being completed.

DEATHS

•

Merle J. Trees, 71 chairman of the board of directors of Chicago Bridge and Iron Company, died August 6 in Chicago. Trees had been with the firm since 1908. His father founded the company in 1889.

•

William Wirt Henry of Tulsa, geologist and independent operator, died August 2. He was formerly vice president of the Atlantic Oil Corporation and geologist for the Henry Oil Company and Continental Corporation.

•

P. J. (Pat) Ryan, store manager and field representative for Bethlehem Supply Company at Graham, Texas, died September 18. Ryan had been employed by Bethlehem Supply since 1936 and had been store manager at Graham for the past 11 years.

•

S. D. Swain, 66, died September 22 at his home in Indianapolis, Ind. He was a former resident of Bartlesville, Okla., and was an independent oil operator in northeast Oklahoma.

•

Covel Pierce (Cotton) Godsey, 53, of Tulsa, Olka., supervisor for The Carter Oil Company, died September 24 at his home. He had been with Carter for 34 years, beginning as a clerk in the Accounting department.

•

Wallace B. Pardoe, 56, independent oilman, died September 29 in Tulsa. Pardoe was with Sinclair Oil & Gas Company and Shell Oil Company in Texas, Oklahoma and Indiana prior to becoming an independent operator in 1931.

•

C. A. Stanley, 79, formerly district foreman for Natural Gas Pipe Line Company before his retirement, died September 29 in Tulsa.

•

Clarence F. Knollenberg, 63, production superintendent for Sun Oil Company in Michigan, died September 12 in Mount Pleasant, Mich.

•

Col. John H. Leavell, 71, Tulsa mining engineer and oilman, died in Honolulu in September.

•

William Yates Blair, 62, production superintendent for Tide Water Associated Oil Company, died recently in Ventura, Calif.

•

Maximilian H. Leister, 63, retired general manager of Sun Oil Company's Motor Products department, died September 19.

•

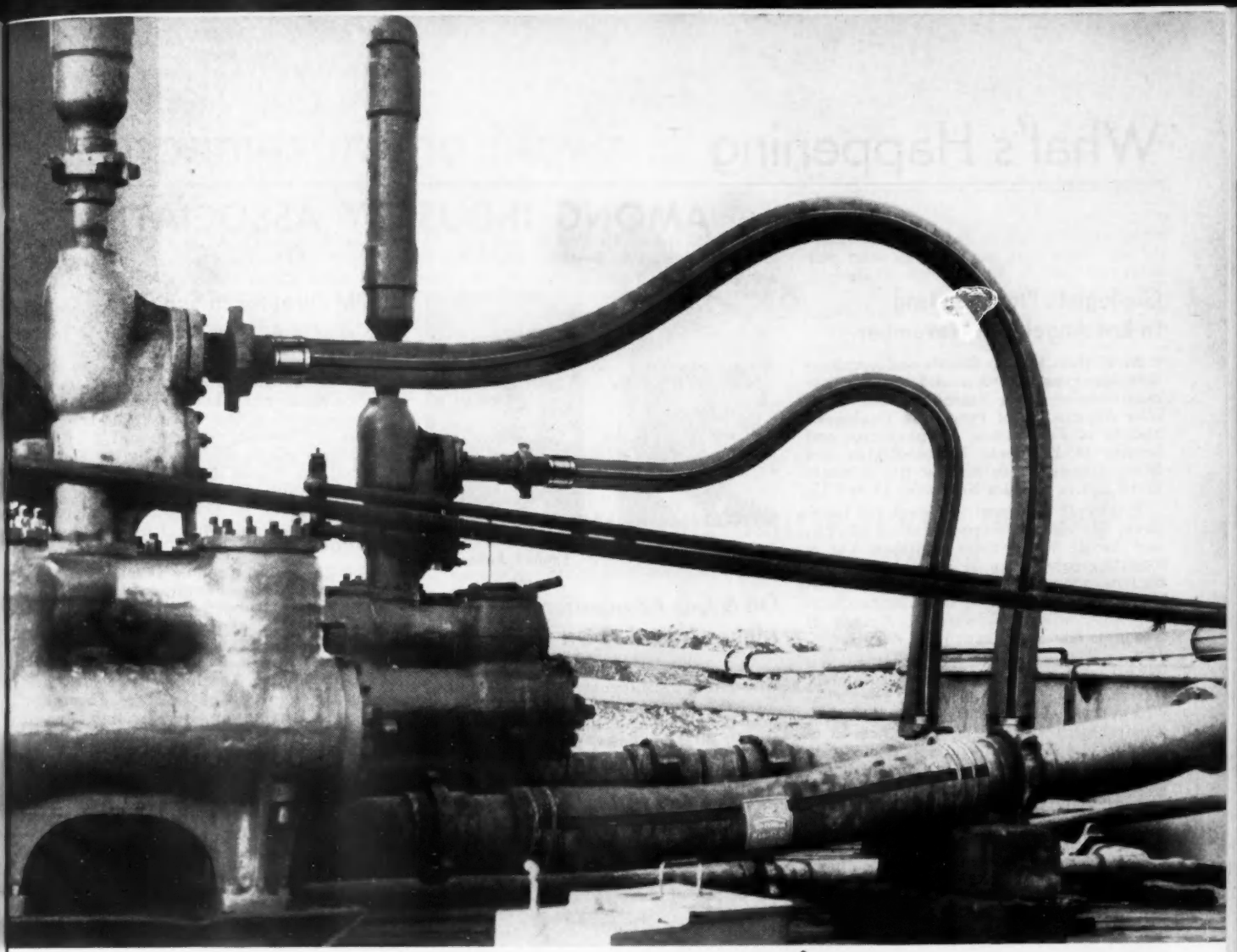
B. H. Allison, 67, died September 9 near Drumright, Okla. Allison retired in 1952 after 35 years of service with Mid-Continent Petroleum Corporation and its predecessor, Cosden Oil and Gas Company. He was district production superintendent at Drumright at the time of his retirement. At the time of his death Allison was employed as production superintendent for O. F. Warren, Tulsa oil operator.

•

Carl Conley, 72, pioneer Oklahoma oilman, died September 14 in Tulsa.

•

LeRoy E. Allen, 60, sales representative for Mid-Continent Petroleum Corporation, died September 14.



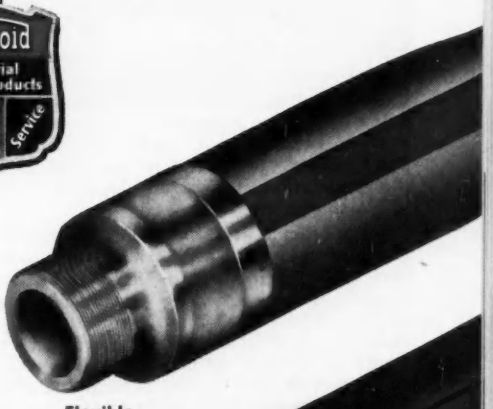
Thermoid Oil Field Products Are Built for Rugged, Continuous Service ...to Cut Your Drilling Costs

Thermoid Flexible Discharge Units provide rugged high pressure connections between mud pump and standpipe . . . eliminate sharp angle fittings, thus reducing turbulence and loss of pressure. Easily installed, they take up misalignment, save rig up and tear down time, resist vibration, cut time lost due to pipe breakage and loosened connections. Full flow pressure seal couplings are built in. Supplied in diameters of 2½", 3" and 3½" . . . standard lengths. Pre-tested to 5000 psi to assure blowout-proof performance.

Thermoid Mud-Flo Suction Hose absorbs pumping vibration and affords maximum flexibility. Thick inner tube and heavy galvanized wire reinforcement imbedded in rubber compound prevents collapse and provides unobstructed flow. Permits changing position of intake without changing connections. Cover withstands abrasion and weathering. Ends are sealed to help keep out moisture.

To keep your costs down, be sure you specify Thermoid Flexible Discharge Units and Mud-Flo Suction Hose.

Mid-Continent Offices and Warehouse, Houston, Texas
California Offices and Warehouse, Los Angeles



Flexible Discharge Unit

Mud-Flo Suction Hose

SEE OUR CATALOG IN THE COMPOSITE CATALOG

Thermoid

Powerflex Rotary Hose • Trioflex Slim-Hole Rotary Hose • Mud-Flo Slush Pump Hose • Flexible Discharge Units • F.H.P. and Multiple V-Belts • Oil Country Flat Belting

Wire Line Turn Backs • No-Wip Line Savers • Stuffing Box Rings • All Types of Hose • Molded Specialties • Brake Blocks

Thermoid Company • Offices & Factories: Trenton, N. J., Nephi, Utah

What's Happening

AMONG INDUSTRY ASSOCIATIONS

Geologists Plan Meeting In Los Angeles in November

More than 1000 geologists and geophysicists are expected to attend the 31st annual meeting of the Pacific Section, American Association of Petroleum Geologists, Society of Exploration Geophysicists, and Society of Economic Paleontologists and Mineralogists, to be held at the Biltmore Hotel in Los Angeles November 11 and 12.

E. Harold Rader of Standard Oil Company, Pacific Coast president of AAPG, and Loyde H. Metzner of Signal Oil & Gas Company, who is general chairman for the convention, have announced that the principal speaker at the joint luncheon Thursday will be Edward A. Koester of Wichita, Kansas, president of AAPG.

At the dinner of the SEPM Dr. Francis P. Shepard, of the Scripps Institute of Oceanography, La Jolla, will speak on "New Methods of Identifying Sedimentary Environment." At the Friday luncheon of the SEG, Leo R. Newfarmer, exploration manager for Shell Oil Company, will discuss "The Present-Day Frontiers of Oil Exploration."

Highlight of the convention program will be a marine symposium on Thursday, which includes a discussion of all techniques of offshore exploration. Frank J. Hortig, Mineral Resources Engineer for the California State Lands Commission, will speak on the status of State leases offshore.

Desk and Derrick Clubs Elect New Officers

Mrs. Sybil Sureck, vice president and secretary of Union Oil Company of Oklahoma and office manager and secretary to Patrick J. O'Hornett, owner of the company, was elected president for 1954-55 of the Association of Desk and Derrick Clubs of North America.

Miss Edna Hurry, New York, Standard Oil Company of New Jersey, was named first vice president; Miss Minetta Miller, Denver, secretary to T. S. Baker, oil attorney, was elected second vice president; and Nelle Barclay, Oklahoma City, secretary to Frank M. Porter, president of API, secretary; and Miss Frankie Frensley, Dallas, secretary-treasurer of Daltex Oil Company, Daltex Petroleum Corporation and Scyene Investment Company, as well as being affiliated with the William P. Luse Oil Investments, became treasurer of the organization.

Regional directors include Miss Angela Cross, Plymouth Oil Company, Pittsburgh, region one; Miss Catherine A. Connell, The Texas Company, Chicago, region two; Mrs. Bettie Conley, William Helis Company, New Orleans, region three; Mrs. Eloise Limbocker, The Texas Company, Port Neches, Texas, region four; Miss Irma Cline, Nelson Montgomery, et al of Wichita Falls, Texas, region five; Miss Leta Dillon, Deep Rock Oil Corporation, Tulsa, region six; Mrs. Doris Rooney, Commonwealth Petroleums Ltd., Calgary, region seven; and Miss Pauline Colahan, Monterey Oil Company, Bakersfield, region eight.

E. A. Landreth

Edgar F. Bullard

Oil & Gas Association Makes Award to Oil Men

The Texas Mid-Continent Oil & Gas Association's distinguished service awards for 1954 were presented to E. A. Landreth, Fort Worth independent producer, and Edgar F. Bullard, Tulsa, president of Stanolind Oil and Gas Company, at the annual meeting of the association in San Antonio October 5-6.

The Texas Mid-Continent's distinguished Service award is presented annually to an independent producer and a major company executive for outstanding service to the petroleum industry. Both Landreth and Bullard are advocates of oil and gas conservation.

Landreth, who developed his first oil properties in 1918 at Breckenridge, Texas, erected one of the first casinghead gasoline plants in Texas. Landreth developed properties in important West Texas-New Mexico fields. In the early 1930's he raised funds and gathered support for sound Texas oil and gas conservation laws. In 1938 he sold his West Texas properties and arranged for key employes of the Landreth Corporation to buy stock of the firm. Four years later he organized the Landreth Company, which he serves as chairman of the board. Bullard joined Dixie Oil Company in 1921. He was made director of exploration for Stanolind in 1931 and since that time has played an active part in every phase of the company's development. He became vice president in 1932, executive vice president in 1935, and president of Stanolind ten years later.

Permian Basin Group Organizes at Midland

The Permian Basin Section of the Society of Economic Paleontologists and Mineralogists has been formed at Midland, Texas. Main objective is toward a better understanding of the paleontology, sedimentation and stratigraphy of the Greater Permian Basin.

Members of the steering committee include Garner L. Wilde, Humble Oil & Refining Company, chairman; Wayne Roye, Magnolia Petroleum Company; Tom Schneider, Texas Pacific Coal and Oil; Ed A. Vogler, Shell Oil Company; and Harold L. Williams, Paleontological Laboratory. All are from Midland.

ODM Director to Speak At World Affairs Meeting

Dr. Arthur S. Flemming, director of the Office of Defense Mobilization, will be a leading speaker at a conference on the raw material needs of the U. S., to be held in Dallas on November 15, 16, and 17. The conference will be sponsored by the Dallas Council on World Affairs, according to Glen G. Costin, Executive Director of the Council, and H. N. Mallon, DCWA president. Mallon is also president of Dresser Industries, Inc., Dallas.

Stockpiling for National Defense will be the subject of Dr. Flemming's address. Other topics scheduled for major addresses are Minerals in International Politics, Minerals in World Trade, Energy Sources for Industrial Growth, Mineral Requirements of an Expanding Economy, Known U. S. Resources, and Closing the Gap Through Increased Exploration, Beneficiation, Conservation and Substitution.

Panels and round table discussions will deal with assuring adequate supplies of natural resources at home and abroad. Subjects to be considered in this way are subsidies, depletion allowances, mineral codes, tariffs, tax structures and the creation of a favorable investment climate abroad for American capital.

Other panels will deal with the supply of and demand for Energy Resources, such as oil, coal and uranium, Basic and Structural Metals and Rare Metals and Alloys.

The conference will immediately precede the Dallas meeting of the Midwestern Section of the Society of Exploratory Geophysicists, November 18-19.

Individuals and organizations interested in attending the conference are invited to write for more detailed information to the Dallas Council on World Affairs, 2419 Maple Avenue, Dallas. Hotel reservations are available through the Council.

New Orleans Geological Society Names Officers

New officers of the New Orleans Geological Society for 1954-1955 are headed by E. M. Baysinger of Monterrey Oil Company, president. Others are J. J. Crouere, Natural Gas and Oil Corporation, vice president; L. W. Funkhouser, The California Company, secretary; and Ray A. Burke, Union Oil Company of California, treasurer.

AGA Elects Officers At Annual Convention

F. M. Banks, president of Southern California Gas Company, was elected president of the American Gas Association at the thirty-sixth annual convention of the association at Atlantic City, N. J.

Other officers elected were Dean H. Mitchell, president of Northern Indiana Public Service Company, Hammond, Ind., first vice president; C. H. Zachry, president of Southern Union Gas Company, Dallas, second vice president; and Vincent T. Miles, treasurer of Long Island Lighting Company, Mineola, N. Y., treasurer.

Companies in the News

COLORADO OIL AND GAS CORPORATION, Denver, and **THE DERBY OIL COMPANY,** Wichita, Kansas, have entered into an agreement of merger of the two companies in which Colorado Oil and Gas will be the surviving corporation. Stockholders are to vote November 3 on the proposed merger.

•

CUMMINS & BRINKERHOFF has announced the dissolution of partnership. **Ira Brinkerhoff** will continue consulting in the San Jacinto Building, Houston; and Cummins will operate as **Ralph H. Cummins, Incorporated** with offices in the Fort Worth National Bank Building, Fort Worth; and Texas State Hotel, Houston.

•

MONTEREY EXPLORATION COMPANY, a wholly-owned subsidiary, has been merged with **MONTEREY OIL COMPANY.** Monterey Oil will maintain Mid-Continent division offices in San Antonio, Texas with **Jerome J. O'Brien,** vice president in charge. **H. E. Menger** has been named division geologist and **Colman C. Casey,** division landman and assistant secretary in the mid-continent area. Monterey Oil Company will operate in Louisiana with headquarters in New Orleans under the management of **E. L. Earl.**

•

BLACK JACK DRILLING COMPANY has moved its office from Evansville, Ind., to Point Pleasant, W. Va. Owners of the firm are **John E. Segler,** formerly of Petersburg, Ind., and **Shelby W. Southerland** of Carmi, Ill.

•

PHILLIPS PETROLEUM COMPANY has completed reorganization plans of its Permian Basin land and geological office. Midland has become headquarters for Phillips' West Texas and southeast New Mexico activities headed by **Edwin Van den Beck** as district manager. He succeeds **Fred Ferwald,** who was district land manager and is being transferred to Jackson, Miss., as district manager. Assisting Van den Beck will be **Charles F. Keller,** district land manager, and **Albert M. Schiemenz,** district geologist.

•

WILLIAM R. WHITTAKER CO., LTD., of Los Angeles has transferred all its oil properties to the newly-organized **GIBRALTER OIL COMPANY** with headquarters at Oklahoma City. Properties of **MAPOROL OIL COMPANY,** also controlled by Whittaker, were included in the transfer. **R. M. Vandergrift** is president of the new firm with **R. A. Buchanan** and **Charles Roe Kielty,** vice president; **John H. Ripe,** secretary; **R. F. Lindquist,** treasurer. All are former employes of Whittaker.

•

STANOLIND OIL AND GAS COMPANY has established a new geophysical office at Jackson, Miss. The office will be in the Standard Life Building where Stanolind also has a district exploration office for land and geological operations. **D. W. Ratliff,** field seismograph supervisor, will be in charge of the Jackson and Oklahoma City geophysical offices.

Completion of **CONTINENTAL OIL COMPANY'S** new office facilities in Houston will result in the move of approximately 90 employes from Ponca City, Okla., to Conoco's executive headquarters in Houston. Continental and The Texas National Bank are joint owners of the 21-story office building now under construction on the corner of South Main and Polk Avenue. The building is scheduled for completion in June or July, 1955, at which time Continental will consolidate under one roof all employes now occupying offices in the Sterling, Oil & Gas, and Armstrong Buildings. Most of those who will move from Ponca City to Houston are members of the company's headquarters marketing organization.

It also is probable that Conoco's reservoir engineering staff, headed by John E. Spencer, will transfer its headquarters to Houston.

READ WHAT THIS DRILLER THINKS OF

May 6, 1954

Spang & Co.
P. O. Box 571
Butler, Pa.

Attention: Sales Manager

Gentlemen:

Last summer we purchased a set of your 8" Molloy Bits.

We have used these bits on a number of wells in the San Andres lime which is a very hard formation and a good formation to test the quality of steel in bits. Our experience with the Molloy Bits has been quite satisfactory and so far we have not jumped a pin off of these bits. With other bits we ordinarily jump one or more pins on each well we drill.

These bits stand up for a longer period of time and consequently do not have to be dressed as often. They have presented no problems in dressing or tempering. We use natural gas or butane in our forges.

We are well pleased with the bits and it is our plan to replace our other bits as they wear out with the Molloy Bits.

Yours very truly,
Name on request

For complete information on MOLLOY BITS and FREE CATALOG of other SPANG CABLE TOOLS, consult your nearest SPANG DEALER or write direct to:

The HIGHER STANDARD

SPANG & COMPANY

DEPT. O-6 • BUTLER, PENNSYLVANIA

For over 60 years Manufacturers of Spang Weldless Jars and a Complete Line of Cable System Drilling and Fishing Tools for Oil and Gas Wells, Water Wells, Prospect Drilling and Shot Blast Holes.

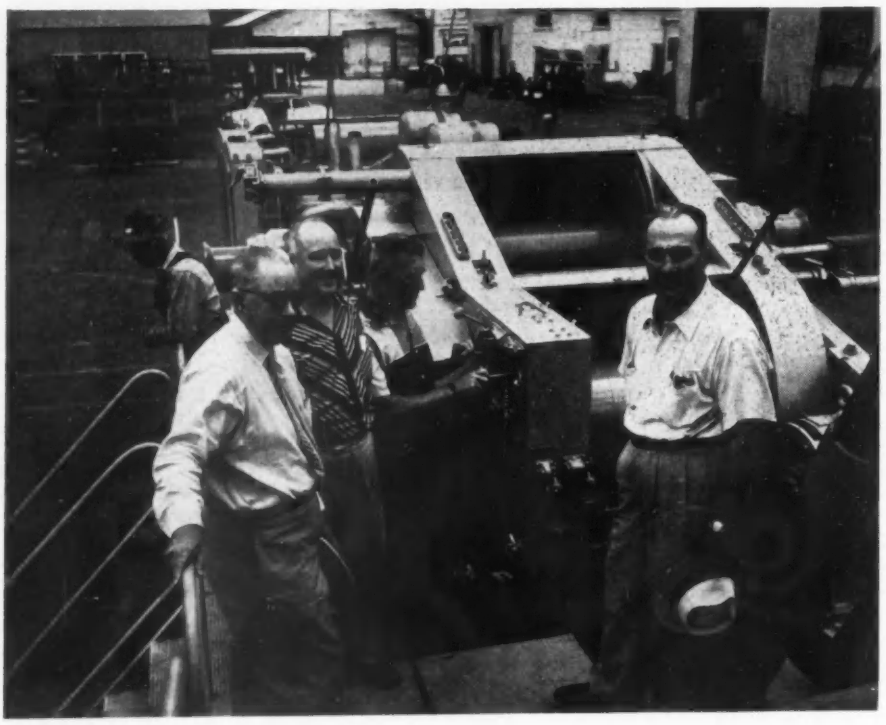
(For more data on advertised products, use Readers' Service blue cards, last page this issue.)

What's Happening

AMONG SERVICE AND SUPPLY MEN

H. C. Smith Oil Tool Opens New Office

Executives and sales engineers of the H. C. Smith Oil Tool Company at the opening of the company's new office and warehouse in Ventura, Calif., are standing, left to right, Ray Faulk, Fillmore branch manager; Herschel C. Smith, vice president and general manager; Virgil Fowler, San Joaquin division manager; Gene Madsen, Southern division manager; Frank Zuech, Cuyuma branch manager; and Ralph Dunn, Service department manager. Kneeling, left to right, Frank Bush, Office; Art Hawkins, Ventura branch manager; Charles Petrie, Ventura sales; Jack Lander, Fillmore sales. Seated, left to right, Tom Eakin, Ventura sales; A. B. Williams, Coast division manager; Art Marshall, general sales manager; H. C. Smith, president; and O. C. Schmidt, chief design engineer.



Executives Visit Control Station in Cuba

Dixie Drilling Company Executives are shown at the drillers control station of the IDECO H-40 Rambler rig which is now operating in Cuba on the Cuban-American concession. Left to right, they are Grant Lindsay, vice president of Dixie Drilling; Ralph Maddox, secretary and treasurer of Dixie and of Cuban-American; H. W. Klein, president of Dixie Drilling and executive vice president of Cuban-American; and George McAnally, drilling superintendent of Dixie. In the background is an IDECO Beaumont plant employe.

Daley Is Export Representative For Continental Supply Company

The Continental Supply Company has announced the appointment of George P. Daley as export sales representative in the South American countries of Colombia, Ecuador, Peru, Chile and Bolivia. He will establish his headquarters in Barranquilla, Colombia, and will operate under the direction of the company's New York export office.

George P. Daley

Daley joined Continental six years ago and for the past two years has served as city salesman in Houston. Prior experience with the supply company includes positions as field salesman and store manager at Harvey, La., and refinery sales representative at Lake Charles, La.

The Western Company Observes Anniversary

The Western Company of Midland, Texas, is observing its fifteenth anniversary of providing technical oil well services to the petroleum industry.

The site of the first Western station in 1939 was Seagraves, Texas, and the company's first acidizing job was performed on the Willard lease about three miles north of Denver City, Texas. In these early days, Western's complete field fleet consisted of two acidizing trucks and one passenger car. Employes totaled four, including the president, Eddie Chiles, who doubled as chief treating engineer. Today the company has a full scale research and development division with complete laboratories, manufacturing shops and 54 highly trained specialists.

Today Western maintains field service points at Seagraves, Levelland, Odessa, Snyder, Borger and Ballinger, Texas; Hobbs, N. M.; Cushing and Healdton, Okla.; and Ulysses, Kansas. The company also has a regional office in Wichita Falls, Texas.

Several of the Western "firsts" are development of the first six-per-foot jet-gun using standard jet charges with one prima cord; introduction of "Dolofrac," an advance-engineered fracturizing solution; new developments in low-surface-tension and de-emulsifying agents for treating acids; adaptation of plating-out techniques in radioactivity tracer surveys; use of internal breakers in fracturing gels and emulsions; pioneer work in "controlled" well treatments with packers; two-way radio for field use; complimentary field engineering studies for "custom-made" remedial well-treatments; and the maintenance of 11,500 foot test well for use in proving new techniques developed in Western's laboratories.

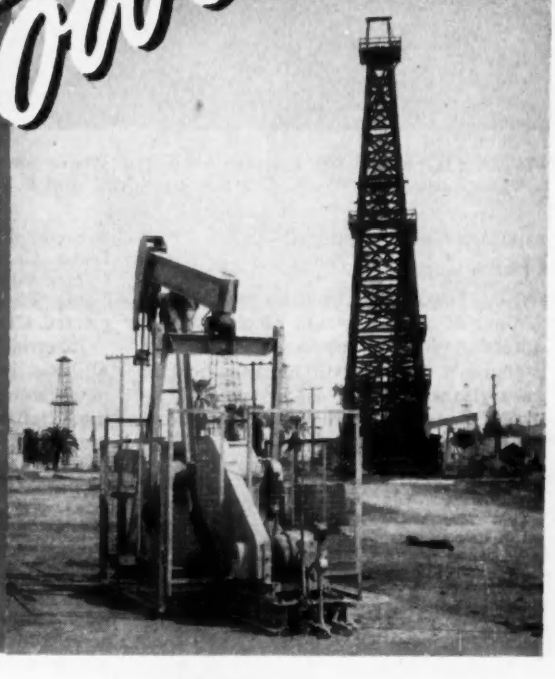
IN SWAMP
— ON DRY LAND
— SMALL OR LARGE
INSTALLATION

PURCHASED

Electric Power

DOES IT

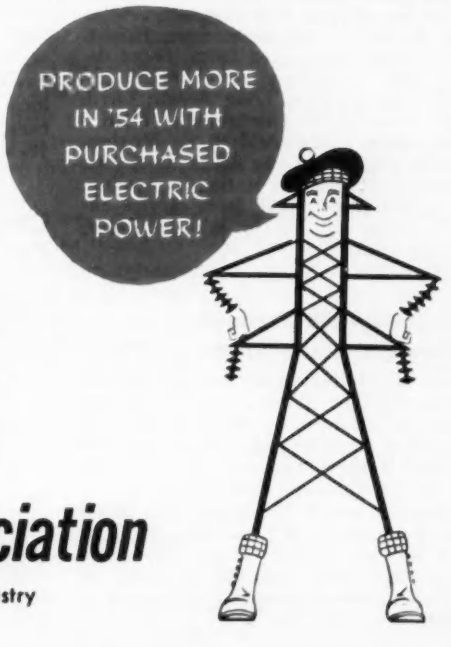
Cheaper



For economical, dependable, practically maintenance-free motive power the industry is relying more and more upon Purchased Electric Power. In literally thousands of installations . . . . in such diverse localities as these . . . . Purchased Electric Power furnishes dependable 24-hour-a-day service at LOWEST POSSIBLE COST!

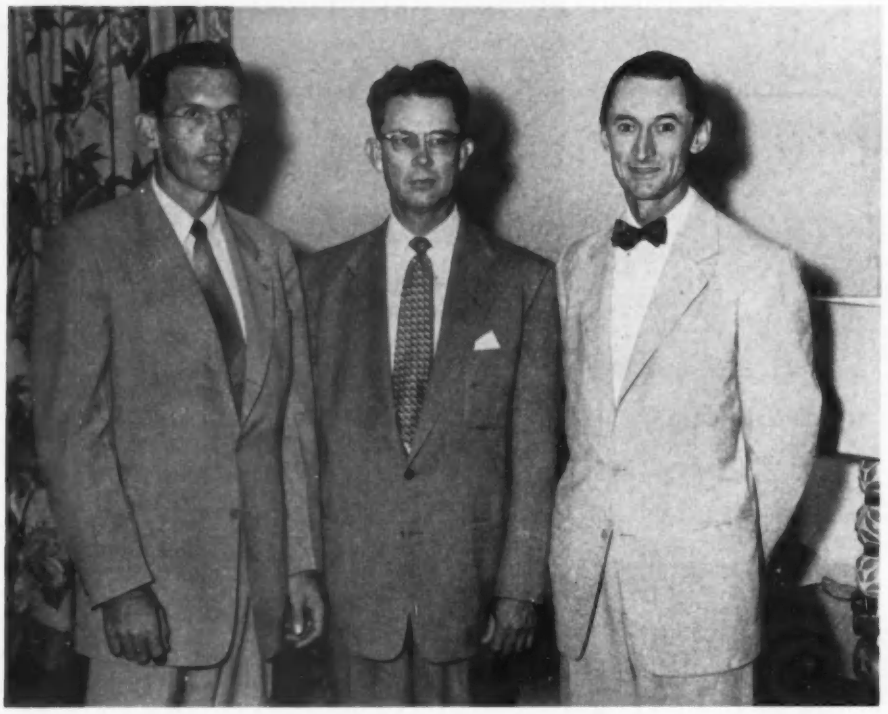
Let Purchased Electric Power go to work for *you!* There's a Power Engineer at your nearest Electric Power Company who can give you the answer to all your power problems. Why not get in touch with him today?

CALL YOUR NEAREST ELECTRIC SERVICE COMPANY for more facts, or address your request to P. O. Box 2771, Dallas, Texas



Petroleum Electric Power association

ORGANIZED in the interest of greater service to the petroleum industry



NEW OFFICERS of the Petroleum Electric Power Association are, left to right, Fred B. Clark, vice president; W. L. Pearson, president; and F. R. Woerner, secretary-treasurer.

Pearson Named President At PEPA Convention

W. L. Pearson of Amarillo was elected president of the Petroleum Electric Power Association for the coming year at the association's twenty-sixth meeting held in New Orleans, October 4-6. Pearson is industrial manager for the Southwestern Public Service Company.

Fred Clark of the Arkansas Power and Light Company, El Dorado, Ark., was elected vice president and Fred Woerner of Texas Electric Service Co., Fort Worth, elected secretary-treasurer.

Electric utilities men and guests from all branches of the petroleum industry from many states were represented at the meeting. Dallas was selected as the meeting place for 1955.

B J Service Announces Transfers and Promotions

Several new promotions and transfers have been announced by B. J. Service, Inc.

Curtis R. Cross, promoted from district superintendent, Bakersfield, to Texas division manager, Midland, Texas; C. W. Ludwig, transferred from sales engineer, Hobbs, N. M., to station superintendent, Hobbs; R. M. Brazier, promoted from Texas division engineer, to chief development engineer, general office, Long Beach; Orrie Luttrell, from sales engineer to district superintendent, Bakersfield; E. L. Hughes, from sales engineer, Long Beach, to station superintendent at a new station in Sterling, Colo.; and George Shell, from service engineer, Tioga, N. D., to sales engineer, Glendive, Mont.

Youngstown Metal Products Has New General Manager

Henry A. Holberson of Youngstown has been elected vice president and general manager of Youngstown Metal Products Company, a subsidiary of The Youngstown Sheet and Tube Company. He succeeds David W. Thomas who died August 24.

Holberson joined Youngstown Metal Products Company in December, 1935, as a tool and die maker. Three years later he became a tool and die designer, an engineer in 1940 and assistant vice president in 1951.

Schlumberger Announces Field Personnel Changes

A number of field personnel changes have been announced by Schlumberger Well Surveying Corporation. W. J. Hickman, who has been field engineer at Tyler, has been transferred to Electra as engineer-in-charge. J. E. Stroop, field engineer at Electra, has been transferred to Coleman as location manager. He succeeds H. B. Baskett, who has gone to Gainesville as location manager. Calvin A. Smethie has been sent to Haskel as location manager. He was formerly field engineer at Graham.

Chrysler Opens Regional Office To Promote Sale of Engines

Opening of a regional office to assist in promotion and sale of Chrysler industrial and Chrysler marine engines in the Los Angeles area has been announced by Chrysler Corporation Marine and Industrial Engine division.

The office, which will be headquarters for Chrysler marine and industrial engines on the West Coast, will be located at Chrysler Motors of California plant in Los Angeles. Frank L. Harris, sales representative in the Chicago territory has been selected to head the new office. R. H. Proctor, formerly sales representative in the Los Angeles area has been assigned to other duties.

Morgan to Represent Alten Foundry And Machine Works on Gulf Coast

Warren M. Benson, vice president and sales manager of Alten Foundry and Machine Works Inc., has announced the appointment of Lloyd W. Morgan as Alten sales representative in the Gulf Coast area.

Lloyd W. Morgan

Morgan entered the petroleum equipment business after his separation from the armed forces in 1945 and has spent the past ten years in the Arkansas - Louisiana - Texas area with the McGriff Sales Company in Shreveport, serving as manager of this company since 1948. Morgan has completed an indoctrination period at all Alten plants and field warehouses and established his headquarters at 1013 Clarence Street, Shreveport, La.

George Joins Manning, Inc. And M & R Specialty Company

Richard P. George has become associated with M. (Bink) Manning Inc. and M & R Specialty Company. He resigned his position as regional superintendent for International Petroleum Co., Ltd. in South America, to accept this new post.

Richard P. George

George is well known in domestic and South American oil circles. He was employed by Phillips Petroleum Company and several drilling contractors prior to joining International Petroleum.

Metal Goods Corporation To Sponsor Exhibition

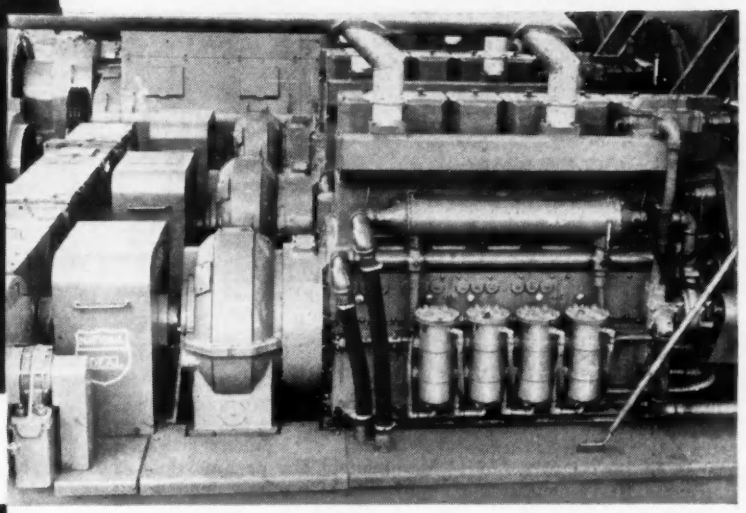
An industrial metals exhibition and clinic, to be held November 17 and 18, 1 p.m. to 8 p.m., at Metal Goods Corporation's Dallas warehouse, has been announced.

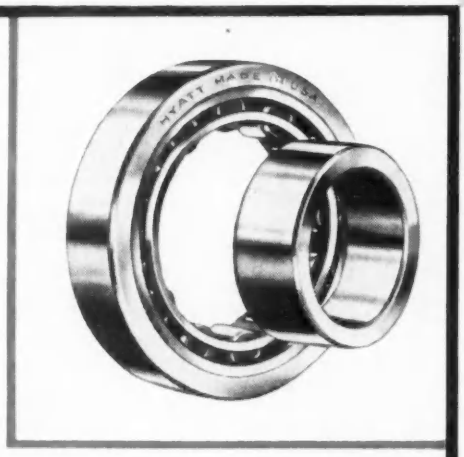
The exhibition and clinic is designed to bring the latest technical developments to the attention of metal users. It will feature demonstrations in welding, silver brazing, finishing, pipe and tube fitting techniques, fastening techniques, and mist elimination. There will be exhibits featuring applications of aluminum, brass, copper, nickel, monel, inconel, stainless steel, and steel.

Technicians from Metal Goods Corporation and its mills will be on hand to answer questions and give demonstrations. Companies participating are Aluminum Company of America, American Brass Company, Armco Steel Corporation, Babcock and Wilcox, Handy and Harmon, H. M. Harper Company, Hoellander Manufacturing Company, International Nickel Company, Jones and Laughlin, Metal Textile Corporation, Parker Appliance Company, Pittsburgh Steel Company, Sawhill Tubular Company, and Tube Turns Inc.

Smoothing the path of power . . .

NATIONAL torque converters





HYATT roller bearings

Oilmen everywhere are investigating the new National Torque Converters. And it's easy to understand.

The ability of the torque converter to isolate torsional vibration, and to absorb sudden and severe impact load, provides smooth, shock-free power transmission, which greatly extends the life of both the engine and the driven equipment.

It's easy, too, to understand why Hyatt Roller Bearings are being used by National in building these converters. Like most equipment builders, National has learned by experience that Hyatts are always outstanding in life, load capacity and operation.

HYATT

STRAIGHT ◯ BARREL ◯ TAPER ◯

HYATT BEARINGS DIVISION • GENERAL MOTORS CORPORATION • HARRISON, NEW JERSEY

Annual Meeting Held

Alex W. McCoy Associates, Inc. of Tulsa, recently held its first annual meeting with geologists and seismologists from over the Rocky Mountain and Western Canadian areas attending. The firm was organized in 1953 to act as petroleum exploration consultants. Shown in the picture are 14 key men of the organization who attended the meeting. Front row, left to right: Carl A. Moritz, vice president, Tulsa; Jerry M. Ewers, manager, Casper, Wyo.; Alex W. McCoy, III, president, Tulsa; Mrs. Virginia Miller, office manager, Tulsa, and E. J. Baltrusaitis, vice president manager, Calgary, Alberta, Canada; middle row, left to right, Thomas Ware III, Casper; Virgil E. Blake, Casper; Owen Bennett, Tulsa; A. Rowland Boucher, Calgary and Richard E. Barnett, Calgary. Top row, left to right, Robert Storch, manager, Denver; John M. Andrichuk, Calgary; James I. Johnson, Casper, and Edward Obroslinski, Tulsa.

Keystone Tool Company Elects C. K. Stillwagon President

C. K. Stillwagon was elected president of Keystone Tool Company at a recent meeting of the company's board of directors. Other officers elected were J. C. Stillwagon, executive vice president; W. H. Ramsey, vice president—production; A. H. Snell, vice president—engineering; and B. C. Pettitt, secretary-treasurer.

Shackford Named Product Engineer Of Division of Roebling Corporation

Charles C. Shackford has been named product engineer of the Electrical Wire division of the John A. Roebling's Sons Corporation.

Shackford joined the Roebling Corporation in 1935 as a student engineer in the Electrical Wire division, following his graduation from Lehigh University where he received a B.S. degree in electrical engineering.

Madden T. Works Resigns As Cameron's Chief Engineer

Madden T. Works has announced his resignation as chief engineer of Cameron Iron Works, Houston. He will do petroleum mechanical consultation work, specializing in drilling and production equipment design.

Works has been associated with Cameron for more than 22 years, joining the company's engineering department soon after his graduation from Rice Institute.

Zapata Petroleum To Purchase Offshore Drilling Platform

Zapata Petroleum Corporation has taken an option to purchase a LeTourneau mobile offshore drilling platform. Construction work on the three-legged, ocean-going drilling platform will begin soon at the R. G. LeTourneau Inc., Vicksburg, Miss. plant and is scheduled for completion in early 1955.

When construction has been finished and testing operations completed, the drilling platform will be floated down the Mississippi River to the Gulf of Mexico where it will be used for tidelands drilling with the platform elevated up to a height of more than 100 feet above the ocean floor.

Oil Well Supply Division Makes Personnel Changes

Several personnel appointments including store managers and field representatives have been announced by U. S. Steel's Oil Well Supply Division.

Clair Haas has been named manager of the Williston, N. D., store and Holland A. Hatcher named manager of the Arkansas City, Kansas, store. James A. Brunnemer will succeed Hatcher as field representative.

Other appointments include Wayne B. Atkins as field representative at Hobbs, N. M., Louis R. Roter, field representative at Monahans, Texas; and George H. Fletcher as field representative at Fort Morgan, Colo.

Ellithorpe to Handle Advertising For Axelson Manufacturing

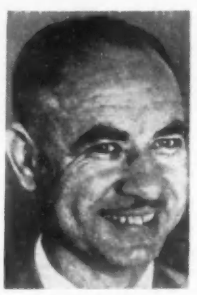
Axelson Manufacturing Company Division, Pressed Steel Car Company, Los Angeles, recently appointed Bruce E. Ellithorpe as director of advertising and public relations. In this capacity, he will be responsible for Axelson's four divisions: petroleum equipment, lathes, aircraft components and foundry.

Bruce Ellithorpe

Ellithorpe was formerly associated with Grant Advertising Agency in Chicago and New York City, as an account executive and previously with the Marlin Electric Company of Chicago as sales manager.

Stan Wright Receives Post With Sargent Engineering

Stan Wright has been appointed application engineer for Sargent Engineering Corporation's Gear division. He will represent the company in industrial and aircraft applications of gears, gear engineering and all phases of gear tooling, design and production.



Stan Wright

Wright was educated in Scotland and is a registered mechanical engineer in California. He brings more than 20 years of specialized gear engineering experience to his new position. This new department includes the latest in modern gear equipment for handling the cutting, grinding, and inspecting of spurs, helicals, straight bevel, spiral bevel, hypoids, curvic clutches, worms and worm wheels.

Republic Supply Appoints Two Field Coordinators

Republic Supply announces the appointment of two field coordinators, M. E. (Mike) Hause and Carl A. Parker, who will immediately begin scheduled visits to the field stores and offices.

Hause has been with Republic for two years and until this new assignment was with the Inventory Control department in the general office.

Parker just recently joined Republic coming from Sinclair Refining Company, New York City, where he served as traveling auditor for five years.

Kaiser Steel Establishes Sales Office in Arizona

Establishment of a sales office in Phoenix, Ariz. for the Kaiser Steel Corporation has been announced. John C. Mackey will be the Kaiser Steel sales representative with offices in Room 4, of the Bank of Douglas Building, 213 North First Avenue. Mackey, prior to his newest assignment, was sales representative in the steel company's Southern district sales office in Los Angeles.

DON'T TELL *Me* THEY'RE ALL ALIKE!

All so-called "*Neutron*" Logs Are *Not* Alike

There's a radical difference between any Neutron-*Gamma* Method and the exclusive PGAC Neutron-*Neutron* Method of logging your well. Consequently, interpretations also are often radically different!

CONSIDER THIS EXPERIENCE

After many years of research, PGAC . . . and PGAC alone . . . perfected Neutron-*Neutron* Simultaneous Radiation Logging and started regular field service early in 1950. That was almost four years — plus successful experience on many thousands of wells — before any other ***simultaneous*** logging method was introduced throughout the oil fields as a ***"new development."*** But there is a much more important factor to remember if a Neutron log is to truly "point the way" . . .

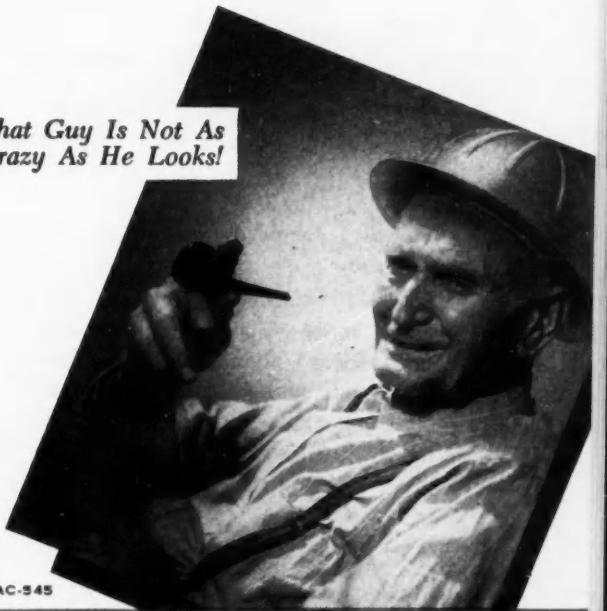
REMEMBER THIS DIFFERENCE

PGAC, and only PGAC, can use the pure Neutron-*Neutron* method. This method has consistently proved superior because it ***absolutely eliminates*** the recording of "foreign" or unwanted ***Gamma*** rays which are ever-present and a risk-of-error factor in any Neutron-*Gamma* method of logging.

WRITE FOR THE FACTS

Write PGAC, P. O. Box 1435, Houston, Texas, and ask for your copies of publications proving ***WHY*** all so-called "Neutron" logging methods are ***NOT*** alike. They are ***free,*** and without obligation of any kind!

That Guy Is Not As Crazy As He Looks!



PGAC-545

PGAC PERFORATING GUNS ATLAS CORPORATION

Houston, Texas Telephone: LYnchburg 4161

General Offices: 3915 Tharp St. — Sales Office: Melrose Bldg. — Main Plant: 7730 Scott St.

31 PGAC OFFICES ALWAYS READY TO SERVE YOU . . . CALL THESE TELEPHONE NUMBERS FOR PROMPT SERVICE

TEXAS: Houston, LYnchburg 4161 — Corpus Christi, 3-1324 — Dallas, RAndolph 2943 — Longview, Plaza 9-4486 — Alice, 4-3424 — Abilene, 2-4172 — Wichita Falls, 2-7151 Gainesville, 2517 — Odessa, 6-6429 — Beaumont, 2-4263 — Victoria, Hillcrest 5-1972 — Graham, 1728.

LOUISIANA: Shreveport, 3-1648 — Lake Charles, 4724 — Lafayette, 4-2396.

KANSAS: Great Bend, 4306 — Liberal, 4822.

OKLAHOMA: Oklahoma City, CEntral 2-5342 — Pauls Valley, 1577 — Seminole, 2938 — Healdton, 77 — Ardmore, 857.

NEW MEXICO: Hobbs, 3-2015.

AFFILIATE COMPANIES: CANADA—Perforating Guns of Canada, Ltd.; Edmonton, Alberta
GERMANY—Atlas Deutsch-Amerikanische Olfelddienst G. m. b. H.; Kiel

Dow Chemical Company Opens Chicago Terminal Office

The Dow Chemical Company announces the opening of a Chicago terminal office to provide improved customer service in the distribution of its products in a six-state marketing area including Minnesota, Wisconsin, Iowa, Illinois, Indiana and Michigan. The office will supervise Dow operations at three Chicago terminals.

In line with its expansion in the Chicago area, the company has just added new storage facilities at General American Tank Storage Terminals to its distribution network.

All three terminals are supplied from the company's headquarters plant at Midland, Mich., and its Texas division plant at Freeport, Texas. L. R. Sulik, in charge of the company's Eastern Terminal office at Newark, N. J., will also head the Chicago terminal office.

American Iron and Machine Promotes Varney S. Harlin

American Iron and Machine Works recently announced the promotion of Varney S. Harlin to manager of manufacturing and engineering. Harlin will be at the main plant and the tool joint installation plant, both in Oklahoma City.

Harlin marked his twentieth year with American Iron this year. He has served in various capacities, including 14 years as chief engineer before his recent promotion.

R. W. OLSON, left, president of Houston Technical Laboratories, and Cecil H. Green of Geophysical Service, Inc., inspect one of the magnetic recording disks produced by their truck-mounted seismograph equipment.

New Seismic Unit Displayed By Geophysical Service Inc.

In a two-day technical conference held in September at Dallas headquarters of Geophysical Service Inc., GSI division managers and supervisors from the U. S., Canada, and Mexico studied new seismic field equipment and details of its operation and application.

They saw demonstrations of a new magnetic recording system, the MagneDisc; a new conventional seismic amplifier, the HTL 7000-series system; and a new high resolution seismic system for shallow reflection work, the HTL HR system. All are manufactured by Houston Technical Laboratories and were developed in conjunction with GSI.

The GSI supervisory personnel also were brought up to date on results of research and development programs for geophysical instruments and interpretation techniques being conducted by GSI and its associated organizations.

A main feature of the technical conference was study of a GSI recording truck completely equipped for field operations with MagneDisc recorder and 7000-series amplifiers.

Ross Barrett Heads Department For Byron Jackson Company

Ross Barrett has been appointed to head an expanded department responsible for public relations, advertising and sales promotion for Byron Jackson Company. This department will supervise market analysis for new BJ products and services.

Barrett is resigning as vice president and director of a West Coast clothing chain with which he has been associated since 1947 to join Byron Jackson.

Ross Barrett

JOHN JENNINGS
Manager of the Petroleum Dept., Colorado Nat'l Bank

Experience in many fields!

John Jennings has it!
A veteran of the oil industry... a REGISTERED PETROLEUM ENGINEER former Chief Evaluation Engineer for a leading Oklahoma producer. John knows the job from roughnecking to completion in fields wherever oil is produced.

The Colorado National Bank has it!
Oldest bank in the state, the Colorado National has been doing business for 92 years... giving advice, making loans, performing all types of banking services for its customers. Our Petroleum Department is another of many progressive steps, taken to serve you better. Please call on us.

Colorado National Bank
17th at Champa — Member F.D.I.C.
Denver

Hal B. Woodul

George F. Heath

Heath Company Is Representative For Marine Products in Missouri

The Geo. F. Heath Co., St. Louis, Mo., has recently been appointed as factory representative for Marine Products Company.

George F. Heath, a graduate mechanical and civil engineer, and a native of St. Louis, has had his own business since 1946.

Associated with him is M. Hal B. Woodul, also a graduate engineer. The Heath Company will serve the state of Missouri and parts of the adjoining states offering sales and engineering service for Marine Products Company's line of MP straight centrifugal, duraflex rotary, and flomax self-priming centrifugal pumps.

Mid-Continent Supply Promotes G. S. Durbin to Store Manager

Mid-Continent Supply Company in Fort Worth has announced the recent promotion of G. S. Durbin to store manager of the organization's Bowie, Texas, outlet. Durbin formerly served the company as a field salesman in Bowie.

G. S. Durbin

Durbin joined Mid-Continent in 1950 at the Wichita Falls, Texas, location. He transferred to the Bowie store as a field salesman. Durbin had experience with another oil field supply firm prior to joining Mid-Continent.

South American Representative For Oil Center Tool Named

East West Oiltools, C. A. has been named South American representative for Oil Center Tool Company. The company will handle sale of O-C-T products in Venezuela, Colombia, Equador, Peru, South America, and Trinidad, B.W.I.

East West Oiltools has operations in South America representing such companies and products as Magcobar drilling mud, Franks drilling rigs, Universal Packing & Gasket Company, Cummins gas lift valves, Red Devil fluid end parts, Burns Tool Company, and Bettis Rubber Company. Headquarters are in the Del Lago Hotel in Maracaibo. Warehouses are located in Anaco and Maracaibo.

J. B. Harder, who has had many years experience in the oil field equipment business in the U. S. and South America, is president of East West Oiltools. A. J. Thomas, C. L. Smith and W. N. Thornhill are vice presidents.

Ideco Appoints Distributor For North Africa Area

G. W. (Jack) Walton, vice president of Ideco, one of The Dresser Industries, has announced the appointment of Neyrpic-Afrique of Algiers, Algeria, as a distributor and repair depot for Ideco oilfield drilling, workover and servicing equipment, as well as other Ideco exclusive petroleum equipment and supplies. The new agent will serve the North Africa area including Algeria, Morocco and Tunisia.

Maintenance, repair work, replacement parts and technical service will be provided by Neyrpic-Afrique through their major manufacturing plant facilities at Algiers, and branches at Rabat, Morocco and Tunis, Tunisia. Neyrpic-Afrique is an affiliate of Neyrpic-Grenoble, a world-renowned manufacturer of hydro-electric turbines and other large machinery.

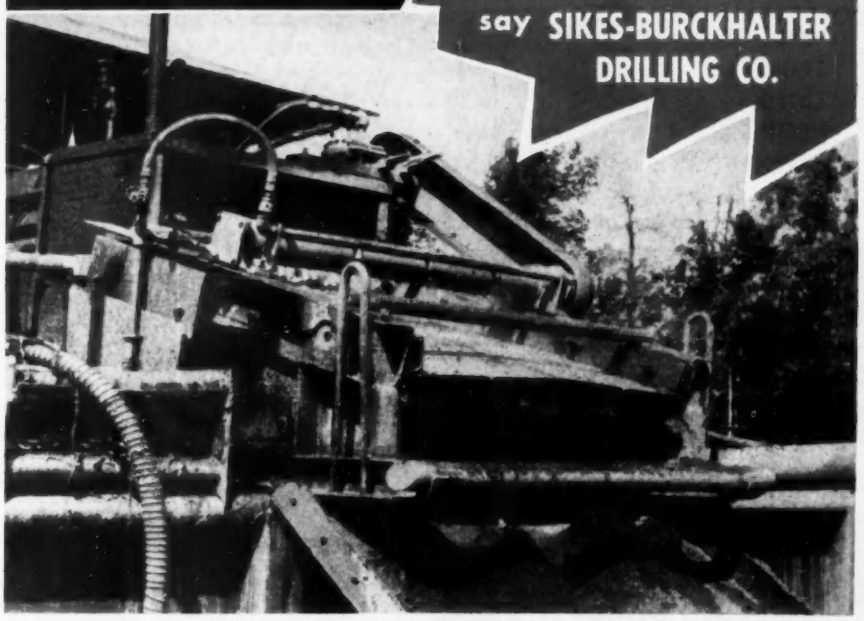
McDonald To Be Sales Engineer For Gulf Coast Division of Welex

Charles D. McDonald has been named division sales engineer for the Gulf Coast division of Welex Jet Services.

McDonald, who recently joined Welex, has a career of 14 years of oil well service behind him, having worked as a division manager and superintendent for equipment and tool companies.

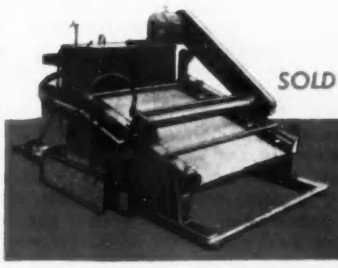
Thompson
VIBRATING SHALE SHAKER

"EFFICIENT and ECONOMICAL..."
say SIKES-BURCKHALTER DRILLING CO.



Sikes-Burckhalter Drilling Company describes the new THOMPSON Vibrating Shale Shaker as "efficient and economical." . . . and you'll agree when you've seen it in operation. Because the THOMPSON Shale Shaker brings you many exclusive features *not found on any other shale shaker* as well as the famous THOMPSON rugged construction that means long, trouble-free life. CHECK the new THOMPSON Vibrating Shale Shaker TODAY . . . *see why you can get more* with THOMPSON Shale Shakers and Separators.

For Complete Details
Write for Bulletin



SOLD THROUGH SUPPLY STORES — EVERYWHERE

Thompson TOOL CO.
IOWA PARK, TEXAS

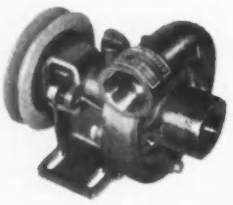
(For more data on advertised products, use Readers' Service blue cards, last page this issue.)

from TARAWA to TEXAS—
OKINAWA to OKLAHOMA
!

MP straight centrifugal pumps have always been demanded for tough, exacting jobs. On beach-heads and in oil fields, MP pumps have proven they can take it.

- All Bronze Corrosion Resistant Construction.
- Continuous operation—wet or dry.
- Belt Drive from any power source.
- Right hand, left hand, or reversible rotation.
- Slotted Base Mountings.
- Capacities to 280 gpm. • Pipe Sizes ¾" to 2".

CIRCULATION
TRANSFER
COOLING
HEATING
FILLING



Available at leading oil field stores.

MARINE PRODUCTS COMPANY
515 LYCASTE AVE., DETROIT 14, MICHIGAN

RUGGED—
ACCURATE—
EFFICIENT!

#3480
100 C.C.
CENTRIFUGE

You can maintain your required speed for the full period of the test with much less effort. Curtin centrifuges, proven world-wide, are heavy duty, rigidly constructed, and extremely simple in design. Illustrated bulletin, giving full details, available upon request.

W·H·CURTIN & CO.
HOUSTON . . . . NEW ORLEANS.

RECENT PROMOTIONS at Kobe, Inc., involve, left to right, R. G. Ralph, W. F. (Pete) Slater, and Ray Elner.

Kobe Names W. F. Slater General Sales Manager

W. F. (Pete) Slater has been named general sales manager of Kobe, Inc. Other promotions announced were R. G. Ralph, named hydraulic service manager; Ray Elner, hydraulic sales manager; and J. T. Lewis, Southern division sales manager.

In his new post Slater will be responsible for hydraulic sales, hydraulic service, pipe processing sales, industrial and export sales, and the Oklahoma City plant. Ralph will head up service and field shop operations, as well as the field testing phase of the company's product research and development program. Elner has been transferred from Fort Worth, where he was Southern division sales manager, to Huntington Park and will have charge of the sales of Kobe hydraulic pumping equipment.

Lewis, formerly West Texas district sales manager, at Midland, has been moved to Fort Worth where he will be Southern division sales manager. S. S. McDonnold will take over the post in Midland vacated by Lewis.

Byron Jackson Announces Expansion in Electronics

Byron Jackson Company has taken another step in the expansion of its Electronic division with the acquisition of The Rollin Company of Pasadena, Calif.

Rollin has specialized since 1944 in the development and manufacture of high precision testing equipment used to evaluate and standardize the performance of electronic operating equipment and measuring devices. Users of this test equipment include radio and television manufacturers, the national bureau of standards, the armed services and the aviation and electronics industries.

Paul J. Holmes, formerly president of Rollin, was named general manager of the BJ Electronic division and will head the expanded activity. It was also announced that plans are under way to acquire or construct a new plant to house the larger engineering and manufacturing facilities.

Dunham Tanks Opens Plant in Louisiana

Dunham Tank of Minden, La., has opened its plant, which has been modernized, to serve the tank market of the oil industry. Anderson-Dunham, Inc., the parent company at Baton Rouge, La., organized Dunham Tanks to supply the industry with tanks manufactured and serviced competently.

Dunham Tanks, managed by Sam Wilson, manufactures bolted and welded steel tanks, stairway and walkway, oil and gas separators, scrubbers, emulsion treaters, emulsion heaters, indirect gas heaters, glycol gas dehydrators, dry desiccant gas dehydrators, cold separation units, free water knockouts and special pressure vessels.

Carley Appointed Chief Engineer For George E. Failing Company

Everett P. Carley has been appointed chief engineer for the George E. Failing Company. Failing's former chief engineer, E. L. (Pete) Alexander, has been made a director of the company with administrative supervision over the Production and Engineering departments.

Everett P. Carley

Carley was graduated from Oklahoma A. and M. College with a B.S. degree in engineering. He has been with the Failing Company for 14 years, having formerly been associated with the Shell Oil Company and Magnolia Petroleum Company.

Ziegler Receives Promotion With Worthington Corporation

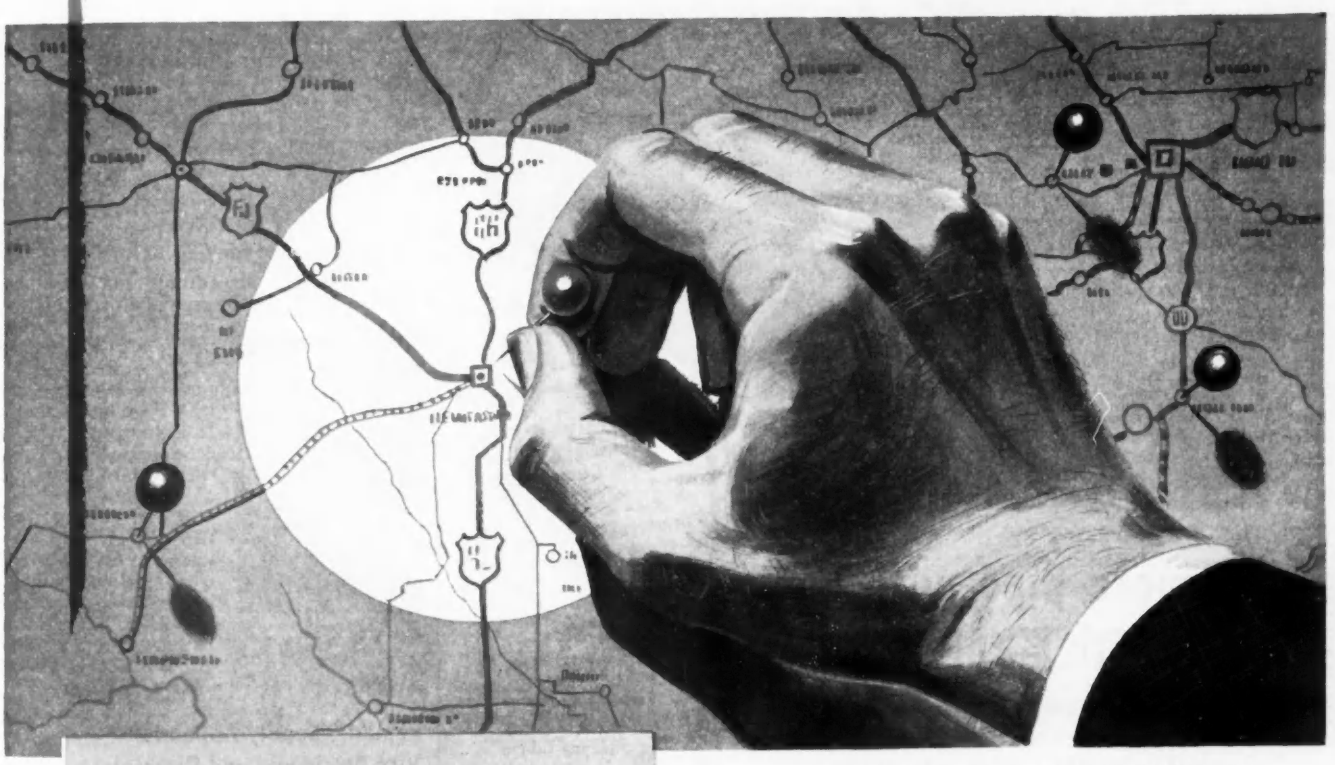
George L. Ziegler, assistant works manager of Worthington Corporation's Buffalo Works since 1951, has been appointed manager parts service for the Corporation. Ziegler will make his headquarters at Harrison, N. J.

Ziegler joined Worthington following his graduation from Northeastern University in 1925, with a mechanical engineering degree. Among other assignments he was manager, Service and Erection Department, Buffalo.

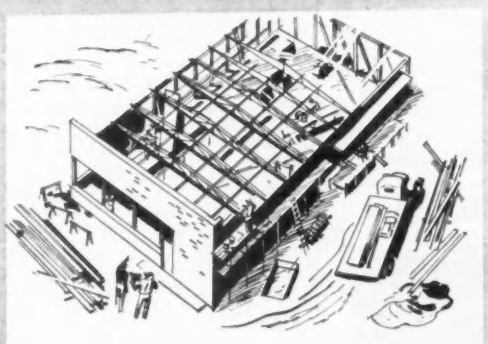
A storepoint is more than just a pinpoint

Each year dozens of additional supply store locations are established as a result of the oil industry's need for stock points in new areas. And each time this process is repeated, manufacturers who sell through these outlets gain a new sales force that has been maneuvered into . . . and carefully calculated to be strategically located . . . near the heart of new oil activity. On the part of supply store management, it takes foresight. It takes courage. It takes confidence. It takes capital.

Further, it takes every bit as much imagination and initiative as a competitive industry can muster. But whatever it takes, oil industry manufacturers and oil operators alike are the winners . . . because each profits by the benefits provided by the supply store industry.



There are now more than 900 supply store locations throughout the United States and Canada. It's sound business to buy . . . and sell . . . through these convenient outlets.

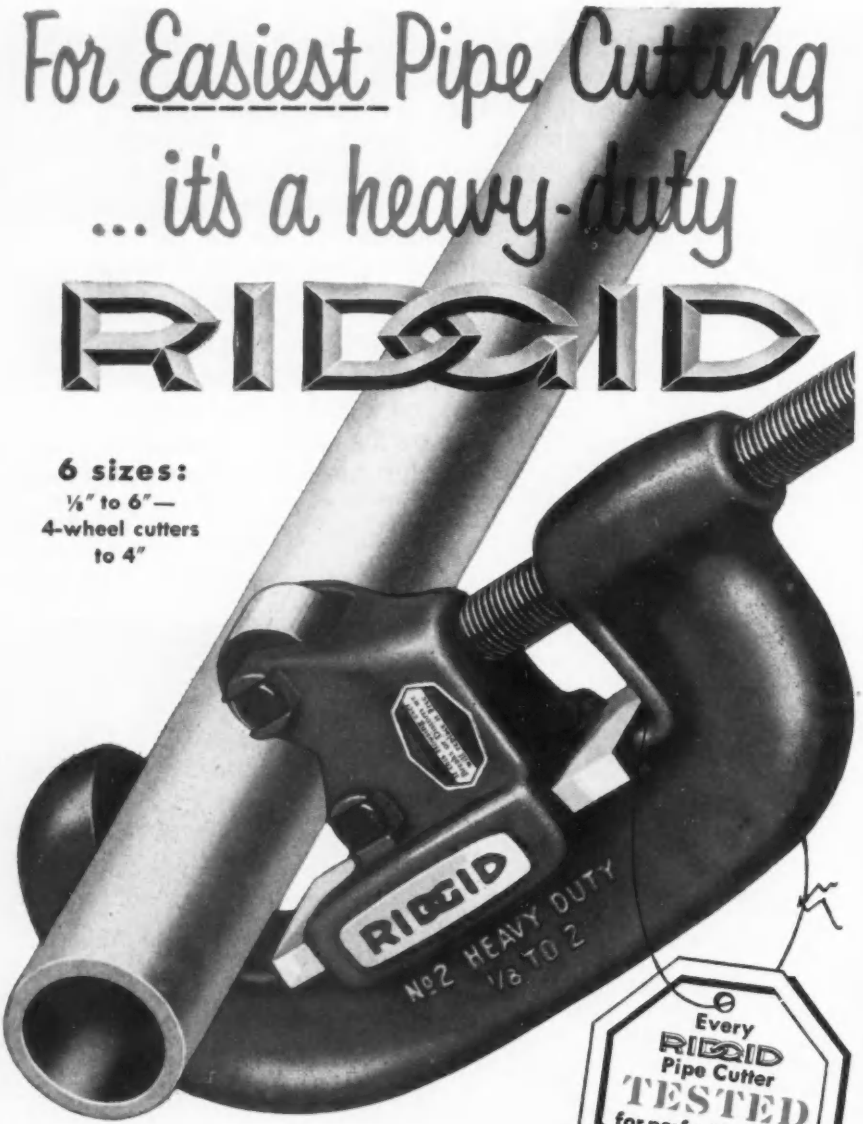


LARKIN

...Through Your Supply Store

LARKIN PACKER COMPANY, INC. • ST. LOUIS, MO.

For Easiest Pipe Cutting ...it's a heavy-duty RIDGID

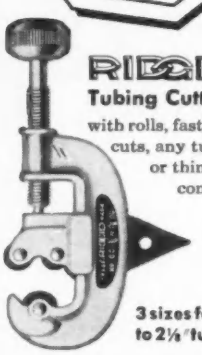


6 sizes:
⅛" to 6"—
4-wheel cutters
to 4"

Every RIDGID Pipe Cutter TESTED for perfect tracking before shipment

Cut more pipe with less work with RIDGID

Once you've put a RIDGID Cutter on a pipe and seen how easily and cleanly it rolls through the metal, you won't want any other kind. Smartly balanced for easy action. Tracks perfectly—and special warp-proof malleable housing keeps it that way. High alloy thin-blade or heavy-duty cutter wheels, practically no burr. For fast cutting with least effort, ask your Supply House for a RIDGID.



RIDGID Tubing Cutter with rolls, fast easy cuts, any tubing or thin wall conduit.

3 sizes for ⅛" to 2⅛" tubing

THE RIDGE TOOL COMPANY, ELYRIA, OHIO, U.S.A.

RIDGID Work-Saver Pipe Tools

Richard E. White

Charles O. Bartley

Mission Manufacturing Appoints White and Bartley to Posts

Richard E. White has been appointed general manager and Charles O. Bartley named works manager of Mission Manufacturing Company. White has been employed by Mission since his graduation from Texas A & M College in 1938. He started as junior engineer and worked up through the engineering and production ranks and was appointed plant superintendent in 1942. White became production manager in 1946 and works manager in 1948.

Bartley, also a veteran with Mission, joined the company in 1941. He was employed as a junior engineer and advanced to production superintendent in 1949.

J. B. Sewell Is Appointed Sales Manager for Garlock

J. B. Sewell of Toronto has been appointed general sales manager of the Garlock Packing Company of Palmyra, N. Y. Sewell will direct the sales of Garlock products through the company's 29 divisional offices throughout the U. S. and Canada.

J. B. Sewell

Sewell started with Garlock in 1935 as salesman for the Montreal area and was appointed vice president in 1947. Sewell will take over the sales duties of Louis Mohn, a vice president who is on sick leave.

Republic Supply Appoints Vice Presidents and Directors

The Republic Supply Company of California has announced the appointment of three new vice presidents and directors. All are company executives and will be members of the executive committee managing the firm. Those appointed are Elton E. Davison, manager of the northern division; Glenn E. Pitts, manager of oilfield sales; and Richard M. Chewning, manager of industrial sales.

Several changes of location for branch store personnel also have been made. R. E. Burbeck is transferred from Taft to Long Beach as branch manager; H. E. Storey is transferred from Ventura branch to Taft and has been promoted to branch manager; A. G. Thorpe is transferred from Bakersfield branch to Ventura, where he is now salesman; W. R. Siverson is transferred from Long Beach to the Huntington Beach branch where he is now manager; and F. B. Cutting, who has been working at Long Beach and Huntington Beach, will spend his full time at Long Beach as salesman.

WORLD OIL'S Trading Post
CLASSIFIED ADVERTISING

RATES: Regular Classified (undisplayed) set in this size type: 12 cents per word. Minimum charge, $3. Blind box address in our care counts six words. Replies forwarded without charge. **Situation wanted ads**, 6 cents per word. **Display ads,** set in suitably larger type with ruled border, $12 per column inch; situation wanted display ads, $6 per column inch. Ten percent discount for two or more insertions of same copy in consecutive issues. **All classified ads payable in advance. COPY DEADLINE:** 17th of month preceding date of issue. Send copy and checks to: **Trading Post Section, World Oil, P. O. Box 2608, Houston, Texas.**

FOR SALE **FOR SALE**

SACRIFICE SALE
2 NEW CLIMAX MODEL V-80 ENGINES

Carries manufacturer's guarantee. 8 cylinders; Displacement 2155 cu. in.; 7" bore, 7" stroke; 1050 RPM. Units include: Engine with Water Pump; Flywheel & Ring Gear; #00 SAE Flywheel Housing; High Compression Cylinder Heads; Intake Manifold; Water Inlet and Outlet Manifolds; Breather Assembly; Magneto Ignition (2 Magnetos) with Spark Plugs and Cables; Mechanical Governor; Instrument Panel with Ignition Switch, Oil Pressure Gauge, Vacuum Gauge and Controls; Thermometers (2) on Water Outlet Manifolds; Cast Iron Box Type Base (Oil Pan); Water Cooled Exhaust Manifold; Radiator, Fan & Fan Guard; Oil Bath Air Cleaners (Vortox); Natural Gas Carburetion, including Regulators; Oil Filter—De Luxe; Safety Devices including High Water Temperature & Low Oil Pressure Cut-Out Switches. Shipping Weight, 12,600 Lbs. Specification No. MS-5206D. Also equipped with Twin Disc Clutch Power Take-Off X-7189B, B-218P.

BOX 45-W, WORLD OIL
HOUSTON, TEXAS

■ U-15 with hydromatic brakes, powered by four 250 horsepower Cummins diesel engines through hydraulic couplings with 127' Lee C. Moore mast, 4½" drill pipe, 6¼" drill collars, Oilwell 14P pump, mechanical Schaffer double BOP and all accessories for complete rig. First class operating condition. Rocky Mountains. Inventory on request. Write Box 42-W, c/o WORLD OIL, Houston, Texas.

1—Model RL 3-Drum Cardwell powered with Buda Model 844D diesel engine. Rig and engine in perfect condition.
1—87' 2-pole mast.
Write Box 41-W, c/o WORLD OIL, Houston, Texas.

■ COMPLETE RIG: New U-15 Drawworks with four 250 horsepower Cummins diesel engines through hydraulic couplings, hydromatic brakes on 127-foot 450,000-lb. Lee C. Moore mast and substructure, 8,000 ft. 4½" drill pipe, 14 new 7" O.D. x 2⅞" bore drill collars, new Emsco D-500 7½" x 16" pump, new Cameron twin hydraulic BOP, and all accessories. Good condition. Now drilling 8,000-foot well in Rocky Mountain area. Inventory on request. Write Box 40-W, c/o WORLD OIL, Houston, Texas.

GASOLINE PLANT FOR SALE

Gasoline Plant, located in Brazoria County, Texas, shut down in January, 1954. Had been processing approximately thirty-three million feet of gas daily with absorber pressure approximately six hundred thirty pounds. Plant recovered Propane, Butane, Gasoline, Kerosene and Diesel Oil. Adequate storage tanks for all products. Drum Lead Blending Plant. Detailed inventory available upon request.

SOUTHERN PRODUCTION CO., INC.
P. O. Box 670, Ft. Worth, Texas

WANTED

■ SCRATCHER, wanted for marketing and/or manufacture in Canada by reliable firm now engaged in oil field work. Write Box 44-W, c/o WORLD OIL, Houston, Texas.

HELP WANTED

■ Petroleum Engineer, preferably recent graduate for Louisiana Gulf Coast work. Duties to require assistance in preparation of reservoir studies, evaluation and routine engineering reports. Work located in New Orleans with reliable and financially strong concern. Reply giving age, previous experience, if any, military status, and salary desired. Inquiries will be kept strictly confidential. Our employees know of this ad. Box 38-W, c/o World Oil, Houston, Texas.

POSITION WANTED

■ ATTORNEY, 36, presently tax attorney with Government, desires position utilizing tax and legal background with corporation in foreign country. Prefer Western Europe, South America or Middle East. Write Box 43-W, c/o WORLD OIL, Houston, Texas.

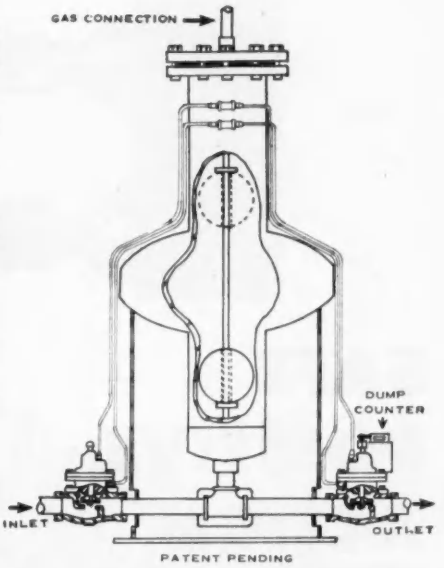
SITUATIONS WANTED

■ PETROLEUM ENGINEER—Fourteen years experience in drilling, production, geology, reservoir engineering, and property evaluation in the United States, Venezuela, and three years in Western Canada. Desires permanent responsible position with progressive large independent or semi-major preferably in Western Canada or Rocky Mountains. Available on short notice. Write Box 46-W, c/o WORLD OIL, Houston, Texas.

BUSINESS OPPORTUNITIES

Well organized, well established oilwell drilling contractor desires the management and supervision of oil properties in West Texas, Central Texas, and New Mexico. Can provide complete handling of oil properties, from acquisition to production. No properties too small, and none too large to handle. Inquiries from independents, groups, small or medium sized oil companies invited. Write, wire, or call collect for further information.

MAKIN DRILLING COMPANY
P. O. Box 1628, Hobbs, New Mexico, Phone 3-3141
146 Allen Building, Midland, Texas, Phone 2-2962



PATENT PENDING

ROLOCHECK
TRADE MARK

The New Oil Well Meter

A new oil well meter has been developed which is simple in design, yet very accurate and eliminates expensive maintenance problems caused by gas, sand and other solids in crude oil. The meter has a high maximum rate and features a zero minimum rate. The new Model No. RM 1-24 will handle as much as 1,440 bbl. per day at 12 psi.

Gas and sand will not affect the new meter any more than they would affect normal control valves in oil lines. The meter actually dumps a positive calibrated dump each time. It may be installed on existing heater-treaters, vertical or horizontal separators. The Rolocheck meter eliminates liquid level controls on the separator as it actually controls the liquid level in the vessel.

OPERATION

(1) Filling: When float hits lower stop, pilot trips to close outlet valve and open inlet valve simultaneously.

(2) Dumping: When float hits upper stop, pilot trips to open outlet valve and close inlet valve simultaneously.

ACCESSORIES

GAGE COCKS, GLASS, & GUARD RODS
0-200° THERMOMETER & WELL

SPECIFICATIONS

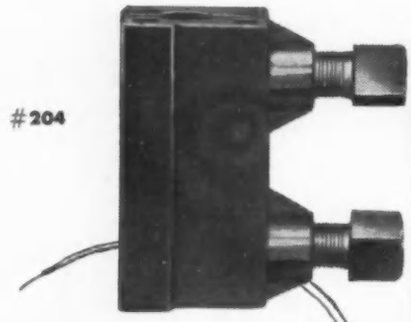
Type	RM 1-24
Working Pressure	150 PSI
Capacity B.P.D.	MIN.—O. Max.—1440*
Height	4'-6"
Width	2'-0"
Weight	356 Lbs.
Gas Connection	1"
Oil Outlet	1½"
Oil Inlet	1½"

*At 12 psi. pressure differential. Available with 2" valves for greater capacity.

ROLO MANUFACTURING COMPANY
P. O. Box 6763, Houston 5, Texas

BRANCHES: Corpus Christi, Midland, Kilgore, Tulsa, New Orleans, Los Angeles, Casper, Mt. Vernon (Ill.); Lima, Peru; Caracas, Venezuela (PETICON).

EXPORT OFFICE: R. S. Stokvis & Sons, Inc., 17 Battery Place, New York, New York.



#204

SAFE POSITIVE ACTION

with

RATIGAN

SURE GRIPS

Ratigan "Sure Grip" Polished Rod Grips have proved extremely popular because of their exceptional gripping and holding power. Once properly installed, you can almost forget them.

Ratigan Grips are designed to accommodate present type pumping units and have a holding capacity of approximately 53,000 lbs., yet are lightweight. Both the Ratigan No. 204 and No. 50 Polished Rod Grips are made in sizes for 1⅛", 1¼", and 1½" polished rods, the No. 204 being particularly suited for pumping units which require a short and narrow gripping device.

#50

All Ratigan Products Are Sold By Leading Supply Stores Everywhere

J. P. RATIGAN, Inc.
1213 Santa Fe Ave., Los Angeles 21
Export: National Supply Co., Inc., Export Div.
600 Fifth Ave., New York 20, N.Y.

SQUEAKS from the BULLWHEEL

Nothing Stops It!

Two Indians watched the building of a lighthouse. When it was finally completed they sat and watched it every night. A thick fog came rolling in one night and the siren blew continuously.

"Ugh," grunted one Indian to the other, "Light shine—bell ring—horn blow—but fog come in just the same."

•

Too Late

Little Girl (saying her prayers): And bless Daddy and Mummy and make them happy—if they're not too old for that sort of thing.

The Moral to the Story

Early to bed and early to rise and so on means that you miss the best TV programs in the evenings and get up just in time for the worst radio shows.

•

Business Ethics

Abie: "Papa, what does it mean, these business ethics?"

Papa: "Well, it's like this. Comes into the store a man who makes a purchase and gives me a bright new $5.00 bill which is just the right amount. I'm turning to the cash register when I discover it is not one, it is two $5.00 bills stuck together. Now comes in these business ethics. Should I tell my partner?"

Gotkool
water cans and coolers
GOTKOOL WATER CAN
Made in 1½, 2, 3, 5, 10, 15 and 20 gallon sizes. Push-Button Faucet at slight additional cost.
KEEP PURE DRINKING WATER ALWAYS HANDY
GOTKOOL WATER COOLER
Made in 2, 3, 5, 8, 10, 15 and 20 gallon sizes with Push-Button Faucet.
GOTT Water Coolers are the convenient way to keep drinking water handy to the worker, protect it from impurities. Their exclusive construction keeps water cool for long periods. Snug-fitting, large, removable top, handy non-leaking push-button faucet. GOTT Water Cans for handy field use. Your supply store has them, get one today!
STANDARD OF THE OIL FIELDS
Insist on the Genuine
Gott
PURE WATER
H. P. GOTT MFG. CO.
WINFIELD, KANSAS

Production Problems?

for a **WHALE** *of an increase call for the* **M-3 BULLET GUN** *or the–*
GLASS JET *PERFORATOR!*

McCullough has the right gun to get the results you want – MORE OIL. For facts and figures write for your copy of "HOW TO GET MORE OIL."

McCullough
TOOL COMPANY
LOS ANGELES • HOUSTON • EDMONTON
OVER 40 OIL FIELD SERVICE BRANCHES
SERVICE ANYWHERE – ANYTIME

FOR BEST RESULTS LOG AND PERFORATE BY McCULLOUGH

PARAMOUNT
IMPROVED
STUFFING-BOX
SAFETY CLAMP

- SAFER
- LIGHTER
- MORE EFFICIENT
- SPRING ACTUATED

Tens-alloy aluminum clamp is self-supporting on the polished rod, can be tightened with one hand, helps prevent accidents.

Available in Six Sizes
Stocked at Leading Supply Stores

Paramount
EQUIPMENT CO., INC.
TULSA, OKLA.

INCREASE PRODUCTION

CLEAN OUT CHOKING SAND

Excessive sand and sediment holds back your oil. For fast, easy clean out with fewer round trips and less down-time, use world famous Miller Sand Pumps.

PUMP & BAILER SIZES
O.D.—2½, 3, 3½, 4¼, 5, 5½, 7 In.
Lengths—20, 25, 30 ft.

Composite Catalog, Page 3433

Write for descriptive price list.

MILLER SAND PUMPS

Miller Sand Pump Co.
General Offices, Box 4516
Oklahoma City 9, Okla.

EXPORT OFFICES
30 Rockefeller Plaza
NEW YORK CITY 20, N. Y.

Mistaken Identity

A woman telephoned her bank to arrange for the disposal of a thousand dollar bond. "Is the bond for redemption or conversion?" a clerk inquired. There was a long pause, then the woman asked: "Am I talking to the First National Bank or the First Baptist Church?"

•

Not Compulsory

The couple signed the hotel register and asked the clerk for the best accommodations. He recommended the bridal suite.

"Why the bridal suite?" asked the young man. "My wife and I have been married for five years."

"Look," said the clerk, "if I let you have the main ballroom that doesn't mean you have to dance, does it?"

•

Middle Age

Another humiliating experience of middle age is when your wife tells you to pull in your stomach and you already have pulled it in!

•

Demagogue

"Father," said a small boy, "what is a demagogue?"

"A demagogue, my son, is a man who can rock the boat himself and persuade everybody else that there is a terrible storm at sea."

•

Overheard

The newlyweds booked the honeymoon suite in a hotel. The bride was a beautiful creature, truly statuesque in figure, and her husband was obviously very much in love with her. The walls were thin, and two sailors occupied the next room.

"My dearest," said the husband, "you are so beautiful. Guess I'll get a sculptor from New York to model you."

A moment later there was a knock at the door. "Who's there?" asked the husband.

"Two sculptors from New York."

Breeding

The ladies met on a train. "I'm from Boston," haughtily remarked one. "There, breeding is everything."

"Well, I'm from St. Louis," the other replied. "We like it there, too, but it's not everything."

•

Some Error

When a treasury clerk found a tax return wherein a bachelor listed one dependent son, he turned it over to the examiner who returned it to the bachelor with the penciled notation:

"This must be a stenographic error."

The bachelor returned the form unchanged with a similar note:

"You're telling me."

•

Miracles

St. Peter and St. Thomas Aquinas were playing golf one heavenly afternoon and St. Peter's first drive was a hole in one. St. Thomas stepped to the tee and also scored a hole in one.

"All right, now," said St. Peter, "let's cut out the miracles and play golf."

•

The Hunt

The members of a hunting party had been specifically requested to bring only male hounds. One indigent member, however, owned only a female, and out of courtesy was finally permitted to include her. The pack was off in a flash. In a matter of seconds they were completely out of sight. The confused hunters stopped to question a farmer in a nearby field, "Did you see some hounds go by here?"

"Yep," said the farmer.

"See where they went?"

"Nope," was the reply, "but it was the first time I ever seen a fox runnin' fifth!"

•

The Boss Suggests

Boss (to stenographer): "Are you doing anything Sunday evening, Miss Hanson?"

Stenographer (hopefully): "Why, no."

The Big Brute: "Then try to get down earlier Monday morning, will you?"

If you want the industry to know you are a BIG contractor, then you had better wear suspenders!

Truthful

First Lawyer: "Say, how'd you like to see the new jail?"

Second Lawyer: "Filled with my wife's friends."

•

Serving Anyway

Nell—"So your boy friend is serving on an island in the Pacific?"

Belle—"Well, almost—he's in Alcatraz."

•

Why A.W.O.L.?

A soldier just returned from three years overseas arrived at a camp near his home town. He was naturally very anxious to see his wife, but try as he would, he could not possibly wrangle over two hours' leave. After six hours' absence, he came back to camp.

"Why the hell are you four hours A.W.O.L.?" barked his sergeant.

"Well, you see," said the soldier, "when I got home I found my wife in the tub and it took me four hours to dry out my uniform."

•

Creation

When a school examination asked for an account of creation, one little girl wrote:

"First God created Adam. He looked at him and said, 'I think if I tried again I could do better.' So he created Eve."

•

Busy Cat

A cat was seen running wildly down alleys, up fire escapes, down cellars and what not. A neighbor knew whose cat it was and reported it. "Your cat is running around like mad."

"Yes, I know," came the reply. "He's just been sterilized and he's rushing around canceling engagements."

•

Journalism?

The cub reporter who was assigned to cover the class play of the high school came in for his share of literary fame, When the following write-up appeared:

"The auditorium was filled with expectant mothers, eagerly awaiting the appearance of their offspring."

The Widow's Will

Have you heard of the lawyer who sat up all night trying to break a widow's will?

•

Resisting Temptation

A woman flees from temptation, but a man crawls away from it in the cheerful hope that it may overtake him.

•

Business Like Sex

Two lobbyists met at a party in Washington. "How's business?" one asked the other.

"Well, you know how it is," said the other. "Business is like sex. When it's good, it's wonderful. When it's bad—it's still pretty good."

Female Suffering

The woman lecturer was going strong. "Yes," she cried, "women have suffered in a thousand ways."

She paused for effect.

"I can think of one way in which they have not suffered and never will," murmured a meek little man in the front row.

The lecturer fixed an unbelieving eye on him. "What way is that?" she demanded.

"They have never suffered in silence."

•

Thwarted!

Can you explain why a woman gets temptingly dressed for conquest — then slaps the man who responds?

In this business— as in every industry— leadership depends on quality of product.

The importance of plastic linings to prevent pipe corrosion, resist paraffin deposition, and provide more flow with less friction is recognized throughout the oil industry.

But all plastics are not alike. When the useful life of equipment costing thousands depends on the plastic lining used, it is sound business judgment to demand the best.

That is why Tube-Kote has been able to retain their leadership in this industry for more than fourteen years—because they provide the finest plastic linings obtainable. The manufacture of non-corrosive plastic linings and plastic pipe is their only business. They have pioneered in plastics since 1939—put all their energy, experience, research, equipment and oil field experience in this one business. This important factor of specialization is your assurance of the finest product obtainable.

Plastic lining at Tube-Kote's Houston plant is a thorough, assembly-line process . . . from the initial pipe cleansing baths . . . multiple neutralizing rinses . . . scale-removing pickling baths . . . continual inspection throughout the process . . . to the automatic, uniform coating with Tube-Kote's exclusive, specially formulated plastic coatings which are thermo-baked to the metal surface.

Tube-Kote gives you the extra quality of product that makes this company the leader in the industry.

Specifications and data about Tube-Kote plastic linings and plastic pipe available on request—write for it.

TUBE-KOTE T.M. REG

TUBE-KOTE, INC.
2520 Holmes Road • P. O. Box 20037
Houston 25, Texas

(For more data on advertised products, use Readers' Service blue cards, last page this issue.)

USE KINZBACH WHIPSTOCKS AND MILLS TO SIDETRACK YOUR HEADACHES

Type "A" Mill

Type "D" Mill

Type "H" Mill

Type "I" Mill

Kinzbach Whipstocks can be set at any depth and require no support for the bottom. Positive setting slips prevent slipping or turning in the hole. The Kinzbach hinge arrangement assures that the top of the Whipstock will be close against pipe wall at all times, permitting easy passage of drilling tools. Setting trigger always locates the Whipstock between couplings so that the window will be within one joint. Kinzbach Whipstocks are available in all popular casing sizes through your supply store.

Use Kinzbach Milling Tools for every whipstocking or metal cutting operation. They have high-speed tool steel inserts which are ground and set at the most efficient angle for fast, uniform cutting action. Shown at left are four popular models—see your Kinzbach Catalog for a description of the complete series of Milling Tools.

KINZBACH TOOL CO INC

KINZBACH TOOL CO., INC.

P. O. Box 277 Houston, Texas
Export Office: 74 Trinity Pl., New York, N. Y.

Notice the thoughtful way he leans, though—likely he *is* an engineer.

Difficulties of the Modern Age

In these days of low-cut gowns, tight-fitting sweaters and sheer stockings it takes will power for a man to look a woman in the eye.

•

Definition of a Bachelor

"What's a bachelor?" a co-ed asked a worldly companion.

"Why a bachelor," answered the fellow, "is a guy who can get a girl on his lap without having her on his hands."

•

Old Age

A woman is growing old when she takes more interest in the fit of her shoes than the fit of her sweater.

•

Hermit

Once upon a time three hermits lived in a cave and spent all day staring at the walls, never speaking. One day a horse ran past the cave entrance. Six months later, one hermit mumbled, "That was a fine brown horse."

Two years after that another hermit said, "That wasn't a brown horse; it was white."

About a year later, the third hermit got up and stalked toward the entrance, exclaiming, "If there's going to be this constant bickering, I'm leaving."

•

Newlyweds

A bride and bridegroom came down to breakfast in the hotel where they had spent the first night of their honeymoon.

"Now, be casual and offhand and they won't know we're newlyweds," cautioned the groom.

While he studied the menu, his bride gave her order to the waiter: "Tea and toast without butter, please."

Whereupon her husband exclaimed in a voice everyone in the place could hear: "Good Heavens, is that all you eat for breakfast?"

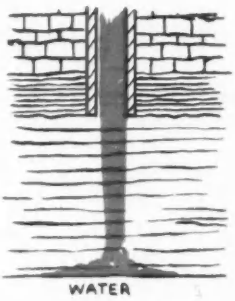
•

Prospects

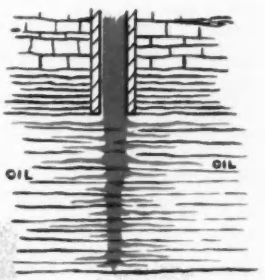
Three small boys were sitting on the curb. One was playing with an airplane, one was playing with a fire engine, and one was reading *Esquire*.

A kindly old gentleman approached and

Block off water and acidize your pay with* PPA



PPA THICKENS
to a viscous temporary blocking agent when it comes in contact with formation water.



PPA THINS
to a retarded, high-penetrating acid when it meets oil . . . tunnels deeper into formation to direct live acid into virgin pay.

WESTERN PPA, an acid-in-oil emulsion, lessens the attraction between acid and formation water . . . blocks the water zone. PPA greatly increases the likelihood of acidizing the oil zone in wells producing dangerously close to water table or making some water. With oil zone penetration established by PPA, conventional acid is directed into the pay . . . increases your production. WESTERN PPA . . . another product of WESTERN RESEARCH.

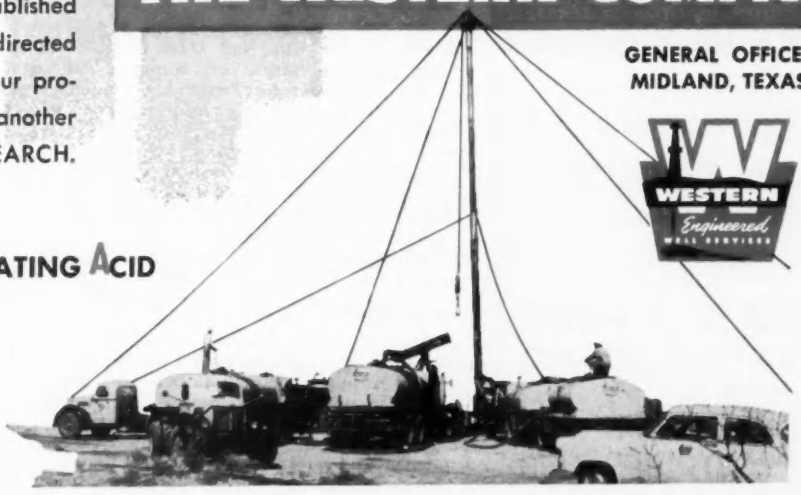
*PREFERENTIAL PENETRATING ACID

Engineered Well Services

- Acidizing
- Fracturizing
- Perforating Jet and Bullet
- Gammatron Radioactivity Well Logging

THE WESTERN COMPANY

GENERAL OFFICES
MIDLAND, TEXAS



CONTACT YOUR FAVORITE SUPPLY HOUSE

STANDARDIZE ON

PARMACO PRODUCTS

•

THEY SATISFY

•

PARKERSBURG MACHINE CO. PARMACO PARKERSBURG, W. VA., U.S.A.

The House of Courteous Service

CONFIDENTIAL

MAP FILE

MT4

Metal cabinet map file with locking doors. 112 tilting tubes. Easy to file and find maps, tracings to 60".

Ideal for home and field offices.

PATENT NO. 1610368 Other Patents Pending

SCOTT-RICE COMPANY

610 S. Main Tulsa 3, Okla.

GUNITE

Since 1915

CONCRETE

SAND AND CEMENT

"Placed by Air"

We have completed over 2600 exclusive GUNITE contracts including — LININGS ENCASING — INSULATING — REPAIRING NEW CONSTRUCTION.

Send for specifications and bulletins

No obligation

See our catalog in Sweets

GUNITE CONCRETE & CONST. CO.

1301 WOODSWETHER RD., KANSAS CITY 5, MO.

2016 W. WALNUT, CHICAGO 12, ILL.

2036 ADDISON, HOUSTON 25, TEXAS

St. Louis—Minneapolis—Denver—New Orleans

Hydrocarbon

WELL LOGGING

Domestic and Foreign

C — B

CARAN BROS. ENGINEERING CO.

Milam Building

San Antonio, Texas

Branch Offices:

Houston and Alice, Texas

Jessop has me worried sick—he locks himself in his room and makes whirling noises.

asked them what they wanted to be when they grew up.

The first replied that he wanted to pilot a jet plane.

The second wanted to be a fireman.

The third, looking up from his magazine, replied, "Aw, it isn't important, I just want to grow up."

•

Time Will Tell

"Why did you tell my mother what time I came home last night?" the grown-up son asked the new maid.

"I didn't," she replied. "She asked me what time you came in and I told her I was too busy cooking breakfast to look at the clock."

•

Turnaround

A worm met another worm coming up from the ground and declared, "You're very beautiful and I'd like to marry you."

"Don't be a dope," was the reply. "I'm your other end."

•

Spectrum Spectacle

Her car stalled at the corner, and the traffic light kept changing—red, yellow, green, red, yellow, green.

The policeman stepped over to the car and asked in a hurt voice: "What's the matter, lady, ain't we got any colors you like?"

•

Earth-Shaking Event

Funeral services were being conducted for a woman who had been warmly disliked in her rural community. With a violent, explosive disposition she henpecked her husband, drove her children mercilessly and quarreled with her neighbors. Even the animals on her place wore a hunted look.

The day was warm and humid, and as the service ended the storm broke furiously. There was a blinding flash followed by a terrific clap of thunder.

"Waal, she's GOT there!" a mourner said.

•

Not Hurt

In a Western cowtown an old man was walking by a saloon when, without warning, a young cowhand dashed out, took a flying leap from the sidewalk and landed on the seat of his pants in the gutter.

The man hurried over to him. "Are you hurt?" he asked.

"No," was the angry reply, "but I'd shore like to meet the so-and-so who moved my horse."

SECONDARY MODERN RECOVERY

TECHNICAL CONSULTING PRODUCTION ENGINEERING SERVICE, INCLUDING CORE ANALYSIS

PRESSURE MAINTENANCE WITH GAS OR WATER

REPRESSURING WITH GAS OR WATER

Water Injection Pumping Units For Pressure Maintenance

Coleman County, Texas

SURVEYS
ESTIMATES
DESIGN
INSTALLATION
SUPERVISION

PETROLEUM ENGINEERS

CABLE ENGINEERING

WICHITA FALLS, TEXAS

HOUSTON LABORATORIES

Analytical and Consulting Chemists

Hydrocarbon Gas Analyses, Reservoir Equilibria Studies for Crude and Condensate Well, Waters, Brines, Corrosion and Industrial Analyses.

Phone CApitol 1319, Box 132, Houston, Texas

FIRST *to help put the future in East Texas oil production...*

Back in the early '30s, when the East Texas oil field was "wide open," the oil industry faced a major problem of price deflation. Through the guidance of the First National Bank in Dallas, proration problems were licked and prices were stabilized. Pioneering a new concept of financing for independent producers, the First provided a new method of making oil loans by helping to establish oil in the ground as a bankable commodity.

FIRST NATIONAL BANK in Dallas

Member Federal Deposit Insurance Corporation

put FIRST financing in your own oil future

What's New in Equipment

Drilling • Production • Exploration

Super Oilfield Pumper

The power plant of the famous "Patton Tank" has been incorporated into Dowell's new Model 133 Super Oilfield Pumper to make it the highest rated trailer-mounted unit in oilfield service. One thousand rated horsepower is divided between two 500-hp Continental air-cooled engines mounted at the forward end of a 26-foot tandem trailer. These engines drive two Dowell Model DR-E 4½ by 8 triplex pumps through two Fuller special 10-speed transmissions, Spicer propeller shafts and chain drive speed reducer units.

The Super Pumper is capable of pumping 17 barrels of fluid per minute at 1700 pounds per square inch discharge pressure, or 3½ barrels per minute at 7500 psi or 2½ barrels per minute at 10,000 psi. Ten of these units are under construction, and will primarily be used for deep well, high-pressure treating and fracturing. The first four units are scheduled for West Texas.

For more data circle **No. E1** on Readers' Service Card, last page this issue.

Pressure Controls

The Mercoid Corporation has placed on the market an addition to the Mercoid series DAW weather resistant pressure controls. Now available in 17 operating ranges from 30-inch vac. to 300-2500 pounds per square inch with sensitivities from 2 ounces to 20 psi, dependent upon range selected, this new control is designed for outdoor use. It has many applications in industries where positive control of pressure is required. The Mercoid series conforms to NEMA specifications.

The case is flanged and has a one-fourth-inch I.P.S. connection. The case and complimentary parts are heavily zinc plated and provided with a special coating which will withstand a 50-hour salt spray test. The cover is neogrene gasketed to the case and vented to provide draining of condensation. Vent is shielded against water when subjected to beating rains or NEMA four hose test.

The gasketed glass port provides visual inspection of electrical contact operation and permits checking operating points on the visible calibrated dial. The external adjustments are also provided with a gasketed cover held in place by a simple wing nut.

The Mercoid series pressure controls are equipped with Mercoid sealed mercury contacts. Multiple circuit arrangements can be furnished to meet various needs.

For more data circle **No. E2** on Readers' Service Card, last page this issue.

Chain Repair Links

A new product to enable dragline operators to repair drag chains with greater speed and ease has been designed by Electric Steel Foundry Company. It consists of the repair links, the hinge pin and a newly developed tightly compressed coil spring that grips the pin, replacing the elliptical collar formerly used.

Dimensional tolerances of this spring are such that upon driving the hinge pin into the spring, the spring is expanded radially, well within the elastic limit of the spring material. When in service the spring material acts as a continual grip on the pin and in continued use has a tendency to grip harder rather than to loosen. These new repair links provide ease of installation, strength, and abrasion resistance. No special tools are needed for installation and links can be installed in a matter of minutes with an ordinary hammer. Complete details are available on this new item now.

For more data circle **No. E3** on Readers' Service Card, last page this issue.

Wire Line Lubricator

The Western Company research group has developed a wire line lubricator for use on high pressure wells. The need for an improved lubricator was shown in The Western Company's tracer surveys where repeated logging runs were made while fluid was being pumped into the well.

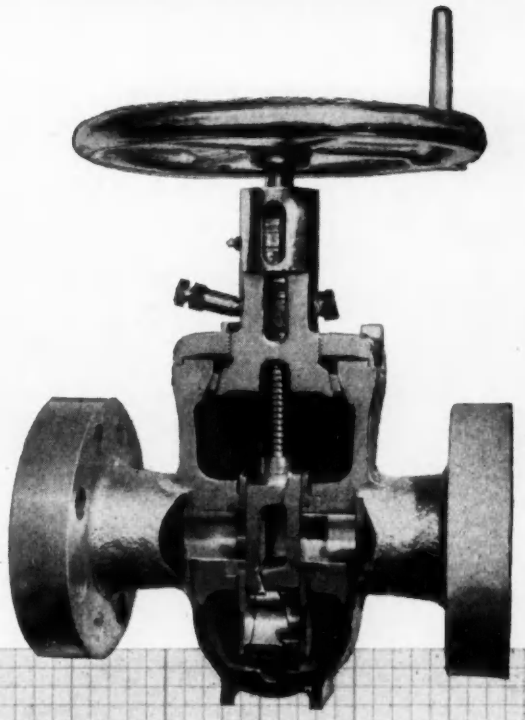
On one job 17 logs were run under 2000 pounds of pressure without any leakage around the line at the lubricator. On another job on a high pressure gas well, the well was kept under control during 15 perforating runs. This type lubricator is applicable to permanent type well completion and will insure positive sealing on a moving stranded wire line.

For more data circle **No. E4** on Readers' Service Card, last page this issue.

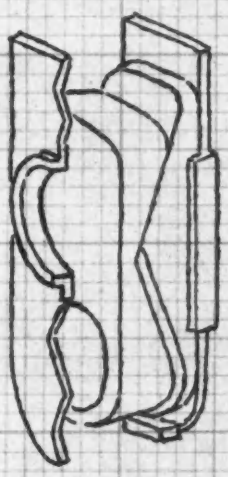
Save time! Keep informed! Circle numbers on Readers' Service Cards, last page this issue.

A SEAL ON BOTH SIDES

MEANS DOUBLE PROTECTION



Two-piece parallel expanding gate construction gives positive up-and-down-stream seal.

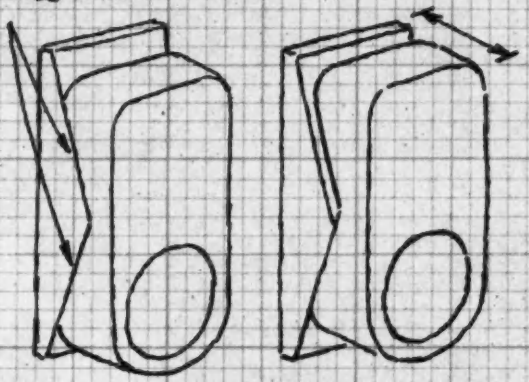


Gates in closed position with rear skirt and seat cut back

The W-K-M design offers by far the most effective seal of any other design. In closed position, the split gate with its parallel faces, seats so tightly against both upstream and downstream seats that it is as positive a seal as a steel plate welded across the conduit. Yet, the gates move freely under all conditions when opening and closing the valve. The sketches at right illustrate the general construction of the gates.

All four planes in intimate contact

Now width of gates is greater

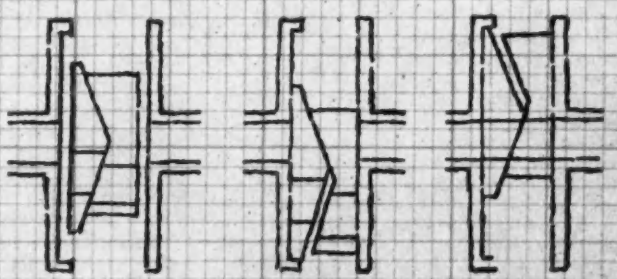


This sketch shows the general construction of the gates. The left pair is in the operating position. Both inclined planes are in intimate contact and the distance from face to face we'll call X. The right sketch shows how the gates appear in expanded position. One gate has been moved up which increases the overall width to X + △X, a width just great enough to provide the desired seating pressure.

The first cross-section sketch, right, illustrates how the gates move within the valve in operating position. The distance from gate face to gate face (X) is a few thousandths smaller than the distance between the seats, thus providing for completely free running while the valve is being operated.

The second sketch shows the position of the gates when the valve is closed. Here the solid portions of the gates bear against the seats at a high pressure obtained by the stem screw and the inclined planes of the gates. It can readily be seen that there is a complete seal on both sides so that direction of flow or pressure have no effect whatever on the perfect seal of the valve.

The last sketch shows the valve in open position. The same seating pressure bears against both seats, but the gate conduits are lined up with the valve conduit providing a smooth, full bore passage for the line fluid. Seating tightly on both sides prevents pressure and foreign materials from entering the body.



Why not call your nearest W-K-M Representative and ask him to show you the "tell all" small-scale working model.

W-K-M Valves

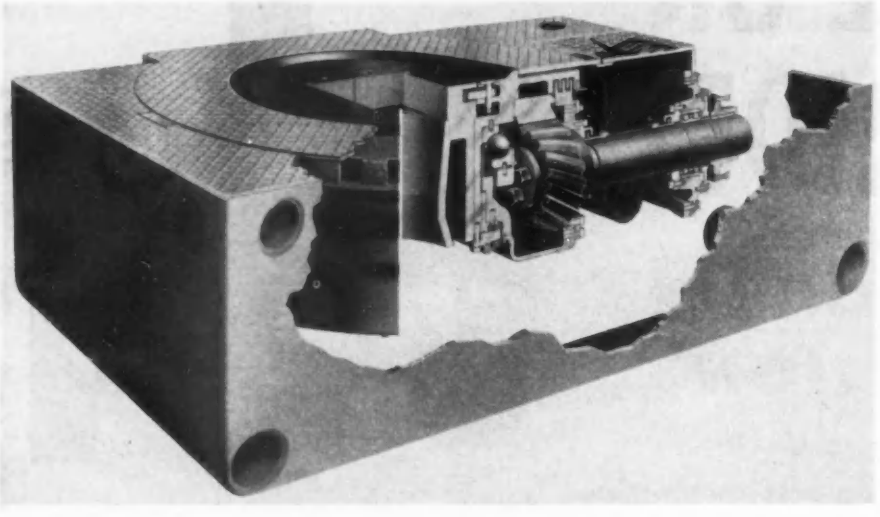
W-K-M MANUFACTURING COMPANY, INC.

A SUBSIDIARY OF A.C.F. INDUSTRIES INCORPORATED

P. O. Box 2117 Houston 1, Texas Los Angeles, California

Export Office: 30 Rockefeller Plaza, New York, N. Y.

DRILLING



Rotary Table

Unit Rig and Equipment Company is manufacturing a new rotary table with extra protection against mud penetration as well as table which is dynamically balanced during final factory run-in and inspection.

The dynamically-balanced table will eliminate primary stress and strain resulting from imbalance vibration. The balancing is accomplished during a high-speed run-in under inspection with a strobe-light device.

Mud proofing is accomplished with a triple labyrinth at the table top, a double labyrinth at the table bottom, and a system of flinger rings and shields at critical points. In extended field tests these protective measures have prevented the entry of mud at any point.

Time and money-saving features include the all-square housing of the rotary table facilitating flooring up. It is designed without surface projections for safety and handing ease. The quieter-running spiral bevel gears are lapped and matched sets. The main bearing consists of 25 perfect hardened and ground balls running in a phenolic retainer. Spiral bevel gears, main bearings and the inboard shaft bearing run in a deep-sump oil bath. Lubrication of the outboard shaft bearing is accomplished through grease fittings located under a door on the table surface. The table is locked by means of a recessed handle in the table top which operates a bolt-like device. It engages in any of 32 indents around the table top, locking the table only. Courtney said that this locking design materially reduces the danger of damage to gears, bearings and shaft due to shock from pipe tonging. The master bushing lock is a strong, simple latching device recessed into the table top. For quickly changing the drive speed ratios, or to adapt the table to various drawworks, bolt-on type sprockets are furnished. These drive sprockets bolt to a hub mounted on the pinion shaft. When desired, a flexible oil bath rotary guard connection will be furnished. This is a large corrugated synthetic rubber diaphragm which absorbs table movement and yet maintains an oil-tight seal to the rotary guard.

Three models of Unit's new rotary table are available. They are the S-21-A (21-inch opening with a 53¼-inch distance from center of table to center of sprocket); the S-17½-A short (17-inch opening with a 44-inch distance from center of table to center of sprocket); and the S-17½-inch-A long (17½-inch opening with a 53¼-inch distance from center of table to center of sprocket).

(This item supplements Unit Rig and Equipment Company data on pages 4997-5016 of the Composite Catalog, 20th Edition.)

For more data circle **No. E5** on Readers' Service Card, last page this issue.

Carfone Radio

Engineering Products Division, Radio Corporation of America has announced the development of the smallest commercial 10-watt two-way radio ever developed for mobile communications. Only 5½ inches high, 9¼ inches wide, and 17¾ inches long, the radio weighs but 40 pounds. The RCA carfone radio produces a minimum of 10 watts over the entire 148 to 175 megacycle band. It can be supplied for either narrow or standard band response and by simple re-arrangement of internal jumpers, can be converted quickly and without additions for either six or 12-volt battery operation.

Other design features include a single vibrator-selenium rectifier power supply, improved circuitry for increased sensitivity, and elimination of heretofore required external relay system.

Engineered for quick and easy maintenace, the new RCA carfone radio provides top-side tuning adjustments, minimum number of different tube types, and a novel internal color coding which identifies all elements of a given portion of the circuit. Test plugs, accessible through slide covers on the front panel, facilitate testing of the unit without need to remove the chasis.

For more data circle **No. E6** on Readers' Service Card, last page this issue.

Air-Actuated Clutch

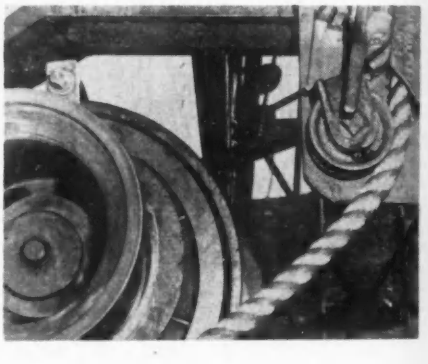
The Twin Disc Clutch Company announces the publication of a bulletin covering the Twin Disc model PO air-actuated clutch.

It describes performance characteristics of the Model PO air-actuated clutch for installation on all types of equipment in the oil fields, on cranes and shovels, on presses and brakes, hoists, and paper mill drives.

Features of the new Model PO air-actuated clutch are extra-high torque capacity (for example, the Model PO-224 has an axial width of only 7.25 inches, yet has a slip torque capacity of 26,100 lbs. ft. using 100 lbs. of air pressure), lighter weight reduces inertia mass, and narrower over-all width provides more compact installation.

Available are sizes 14 inches through 36 inches with troque capacities to 120,000 lbs. ft.; the new Model PO air-actuated clutch offers a ready answer for both replacement on old installations and design into new installations on all types of industrial machinery.

For more data circle **No. E7** on Readers' Service Card, last page this issue.



Catline Grip

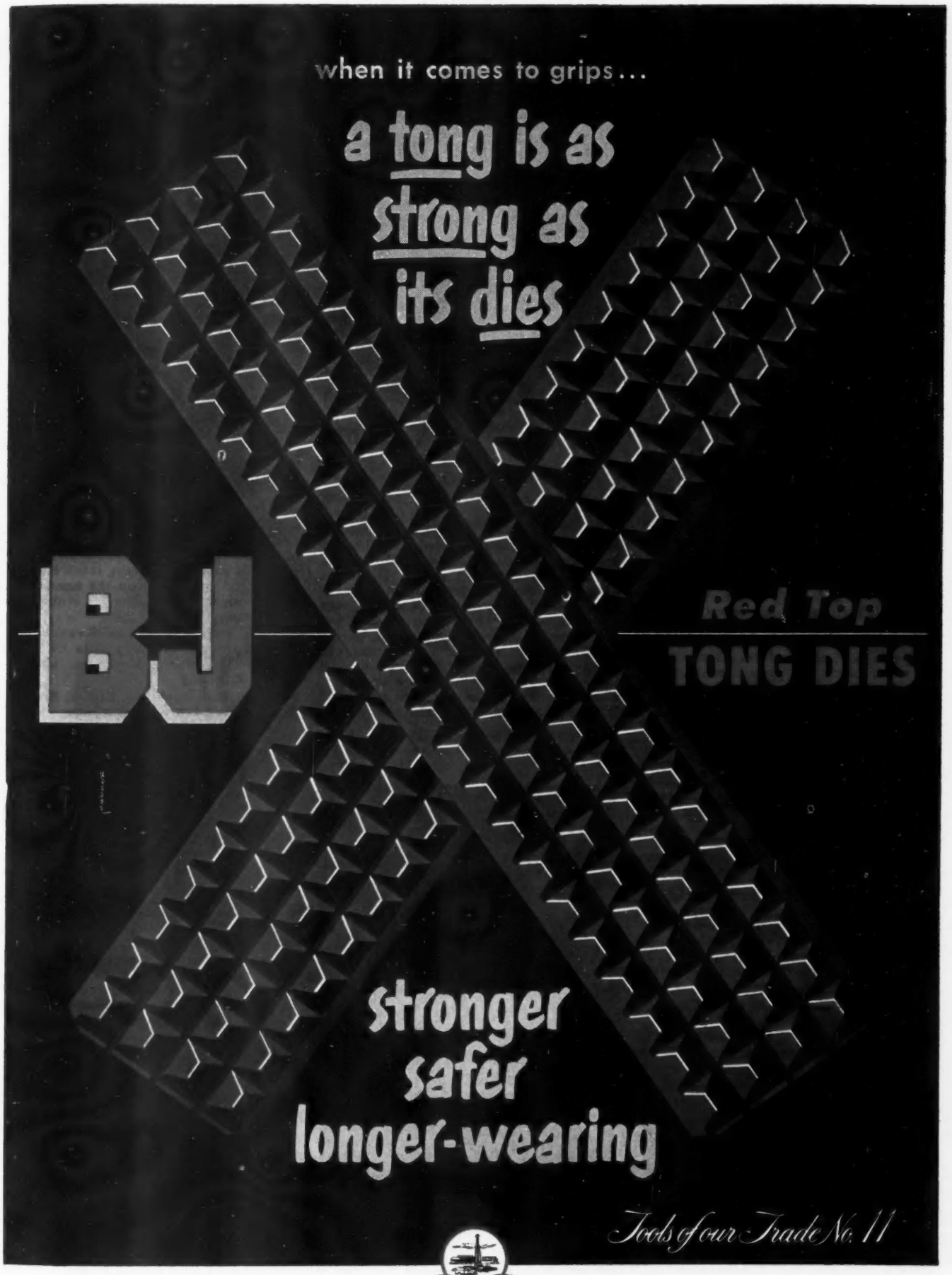
A new roller type catline grip which combines all the safety features of the Byron Jackson standard models, but also provides a special sheave for added catline control, is announced by Byron Jackson Company. This special sheave acts as a guide to give additional control in threading through the catline grip.

All BJ catline grips embody an all-steel safety device which securely holds the catline at any desired point and eliminates the possibility of accidents and burned catlines caused by slipping of the cathead. The line can be inserted or removed instantly through a side opening without threading through the grip. A positive safety latch prevents accidental removal of the line. The eccentric cam wedge is shaped to the contour of 1½-inch rope and designed with dull teeth which take a positive grip without damaging the catline. Both roller type and standard models are designed to take 6000 pounds working load with a four to one safety factor. It is available in right hand or left hand grips.

(This item supplements Byron Jackson Company data on pages 993-1044 of the Composite Catalog, 20th Edition.)

For more data circle **No. E8** on Readers' Service Card, last page this issue.

Save time! Keep informed! Circle numbers on Readers' Service Cards, last page this issue.



BJ MEANS ENGINEERED OIL TOOLS

BJ PB

Byron Jackson Co. Since 1872

LOS ANGELES NEW YORK FORT WORTH HOUSTON

PRODUCTION

Surface Active Material

A new surface active material is now available to the petroleum producing industry for the removal of water blocks in oil bearing formations, according to a release by Atlas Powder Company, manufacturers of the material, and Stanolind Oil and Gas Company, who have developed and tested the method of application.

The product, known as ATPET 931, is an interfacial tension depressant. Nonionic in nature, it gives excellent performance in the presence of varied oil field waters and brines, and will not "plate out" on solid surfaces.

Much petroleum production has been lost in the past because of water penetrating the oil bearing sand, making it difficult or impossible for the crude oil to flow to the well hole. Several methods for releasing this "block" have been used, with varying degrees of success, and often at considerable cost.

The process (patent pending) for the use of ATPET 931 has been developed by Stanolind Oil and Gas Company, and is useful in some cases in stimulating old wells, restoring dead wells, and in completing new wells that are subject to water damage.

The process consists of injecting field crude oil contianing about 1 percent ATPET 931 into the oil bearing formation. By reducing the interfacial tension between the oil and water to practically zero, this new chemical breaks the existing water block and permits oil to again flow through the strata. Usually from 10 to 100 gallons of ATPET 931 is needed per well. Minimum injection equipment is required.

Field tests have been conducted on 90 wells at a total cost of about $39,000 to give a total increased oil production of about 1,217 barrels daily. Thus, the average treatment cost has been about $430 per well, the average payout time has been about 20 days and the cost per daily barrel of increased production has been about $32.

Related applications for ATPET 931 include:

Completions—where water from mud or drilling operations may damage the formation, and as a perforating fluid where water-sensitive formations are encountered.

Recovery of spent acid—ahead of acid jobs where recovery of spent acid may be a problem.

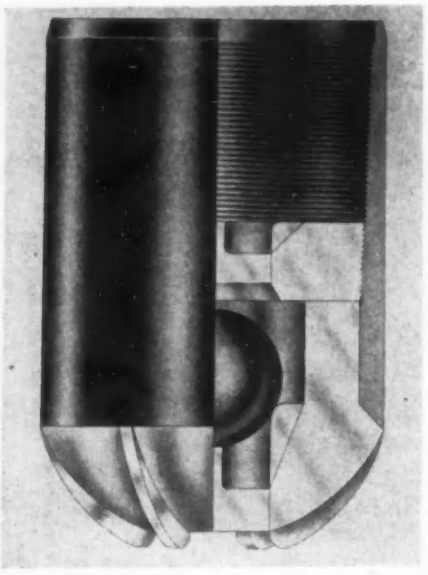
Fracturing—ahead of fracturing jobs to combine the effectiveness of both methods of production stimulation.

Cementing—ahead of cementing when it is feared that water from the cement may damage the producing formation.

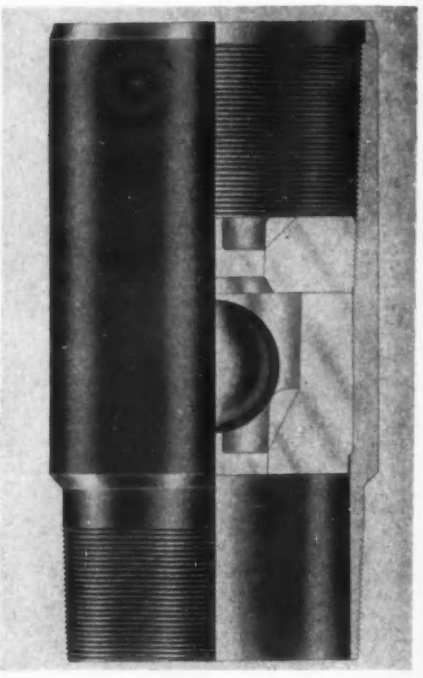
Well logging—procedures involing the loading of the hole with water—ATPET 931 ahead of these operations may aid in regaining production.

Stanolind will license the process to oil field service companies. Technical data is available through Atlas Powder Company.

For more data circle **No. E9** on Readers' Service Card, last page this issue.



Type A Float Shoe



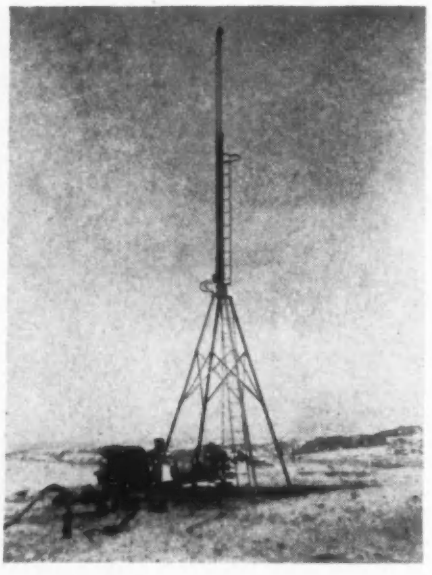
Type A Float Collar

Cementing Shoes And Collars

The Rector Well Equipment Company of Fort Worth has announced new all-metal cementing shoes and collars. Designated as the type A, it uses a special aluminum alloy to replace the usual cement or bakelite internals in the conventional float shoes and float collars. The aluminum alloy has much greater impact, compression, tensile and shear strength than either cement or bakelite. It can be machined and ground to close tolerances, which not only insures more accurate fit in the shoe or collar body, but assures a smoother seating surface for the ball and seat valve arrangement in the shoe and collar. The aluminum alloy is not only easily drillable but, due to its superior strength, much less of it is required in making up the assembly so that considerably less time is required to drill it out.

(This item supplements Rector Well Equipment Company data on pages 4305-4332 of the Composite Catalog, 20th Edition.)

For more data circle **No. E10** on Readers' Service Card, last page this issue.



Hydraulic Pumping Unit

A ten-foot stroke model incorporating all the design features and advantages of its six-foot stroke models has been added by S. C. Carter Company Inc. to its line of hydraulic pumping units for stripper wells. Recommended applications of the new units are for wells where required production may exceed capacity of the six-foot stroke models. Advantages to the operator from the use of the existing six-foot stroke Carter models are accentuated by the longer, upstroke of the new models. The unit consists of a cylinder assembly and compact power unit which includes a positive displacement power pump and storage tank. For normal installations no foundation is required. The cylinder may be simply bolted to the wellhead. The cylinder also may be elevated if desired.

Specifications of the new model are cylinder size 4½-inch I.D.; ten-foot stroke; tank capacity 100 gallons; jackshaft diameter 1 7/16-inch; standard pump model V144; shipping weight 1150 pounds; net piston area 14.9 square inches; piston displacement 7.74 gallons; maximum operating pressure 750 pounds per square inch; maximum polished road load 11,000 pounds; and maximum strokes per minute 3.3.

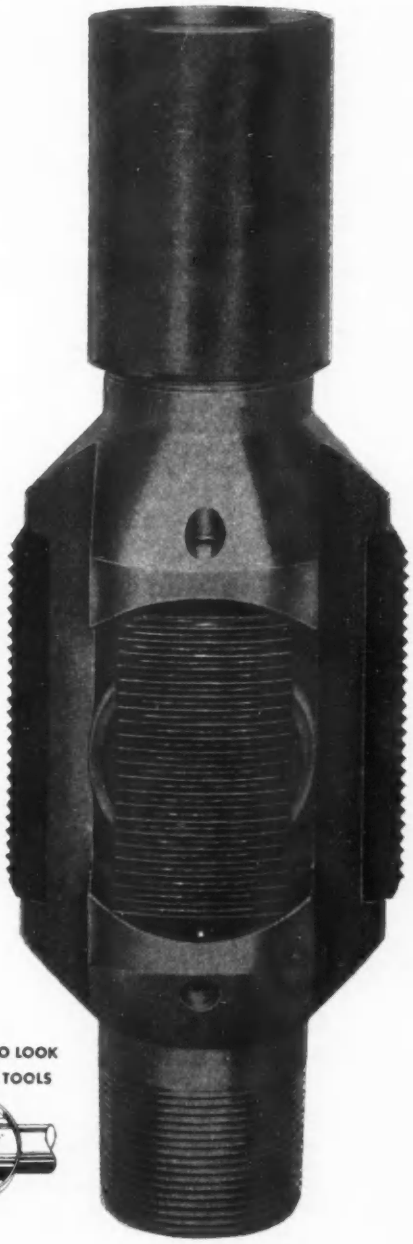
(This item supplements S. C. Carter Varicycle Company data on page 1211 of the Composite Catalog, 20th Edition.)

For more data circle **No. E11** on Readers' Service Card, last page this issue.

Save time! Keep informed! Circle numbers on Readers' Service Cards, last page this issue.

One piston tubing anchor keeps tubing in hole longer—cuts well pulling costs

PAGE* TYPE R TUBING ANCHOR



THE NAME TO LOOK FOR ON OIL TOOLS

U. S. Pat. No. 2,658,459

1. ONE PISTON ACTUATING ONE LIVE SLIP
2. TWO REPLACEABLE FIXED SLIPS
3. LARGE WATERCOURSES FOR GAS PASSAGE
4. RADIALLY "V" CUT TEETH ASSURES EFFECTIVE HOLDING POWER IN BOTH DIRECTIONS AND LONG SLIP LIFE

1. *ONE PISTON TUBING ANCHOR*
2. *PISTON PROTECTED AGAINST WELL EFFLUENTS*
3. *PROPER DISTRIBUTION OF POWER TO CASING*
4. *FIXED SLIPS ELIMINATE GYRATION*

Stop tubing travel with this powerful positive-holding Page type "R" Hydraulic Tubing Anchor. Simplicity of design is an outstanding feature of this tool.

The tubing is correctly suspended in the hole, and kept there longer because anchoring the Page "Tension" way greatly minimizes tubing thread leaks and interior wear between tubing and rods. Pumping cycles are smoothed out as hundreds of dynagraph cards testify.

A single piston which is removable in a matter of minutes is used to power a live slip. This large pressured piston and slip working opposite two unpressured slips utilizes a simple leverage law, producing maximum pressure in the correct locations. This equal distribution of power affords a stability and rigidity that other contact combinations cannot achieve. The piston assembly, made of stainless steel is so designed that it is easily replaceable in the field. Available in all tubing sizes and casing weights. Wire or write for prices and delivery.

**Registered U. S. Patent Office*

PAGE
OIL TOOLS, INC.
3356 LIME AVENUE
LONG BEACH 7, CALIF.

DISTRIBUTORS: Emsco Manufacturing Co., Los Angeles, Calif. and Garland, Texas. All Field Stores.
The Continental Supply Co., Continental Bldg., Dallas, Texas. All Field Stores.

EXPORT: The Continental Supply Company, Inc. 45 Rockefeller Plaza, New York 20, N. Y. All Field Stores.

CUT STUCK SAND LINES INSIDE TUBING

KINLEY SAND LINE CUTTER

M. M. Kinley Company Licensees

ABILENE, TEXAS
Hudson-Eads, Inc. - - - - - - - - - - - - - 2-5331

CORPUS CHRISTI
Tubokut Wireline Services - - - - - - - - 5-1811
Wireline Specialties Co. - - - - - - - - - 3-2196

HOBBS
Horne Well Service Co. - - - - - - - - - - 3-5396

HOUSTON
Adair Service Co. - - - - WE-6497, HU 6-3462

MIDLAND
Luccous - - - - - - - - - - - - - 4-8471, 4-4320

OKLAHOMA CITY
Rainbo Service Co. - - - ME 4-2131, ME 2-3045

WICHITA FALLS
Hudson-Eads, Inc. - - - 2-3767, 2-8584, 3-4690

Shut Down Pumping Equipment *Automatically*

WHEN: Tank is pumped out. Line breaks or leaks. Lines "paraffin up" or remote valves are closed.

REGULAR—45 Series

For distributor, magneto or dual magneto engines.

MURPHY Safety Switches provide accurate gauge and safety protection in ONE low-cost instrument.

E-45 Series

Same accurate gauge and safety protection for electric motor powered equipment

Sold by Engine Dealers and Supply Stores
Write for Information

FRANK W. MURPHY *Manufacturer*
BOX 1476 TULSA, OKLA.
BRANCH LOS ANGELES 61, CALIFORNIA

New Equipment Literature

Separator Bulletin

The Petreco Division of Petrolite Corporation is announcing the publication of an illustrative booklet descriptive of the new Petreco electric sediment separator. The booklet describes the sediment separating equipment and gives details on how it increases life of sub-surface hydraulic pumping equipment by preventing wear and abrasion caused by inorganic solids in power oil.

To get a copy, circle **No. E12** on Readers' Service Card, last page this issue.

Production Brochure

Agate Anchor Sales Company has published a brochure illustrating and describing their two newly-perfected production tools for pumping wells. These tools are being widely used to control pumping problems involved with sand, gas, and froth in oil wells. The sand and gas anchor is used primarily for sand conditions and as a gas anchor. The froth anchor is applied for a low pump efficiency and high fluid level over the pump result from a froth in the well. In each tool, a fluid level is maintained in the barrel of the tool to separate gas efficiently from liquid.

To get a copy, circle **No. E13** on Readers' Service Card, last page this issue.

Pump Catalog

"Industrial Catalog I-54," a new 108-page illustrated catalog, describes practically every industrial pump now made by the Deming Company.

The catalog includes information on construction features and performance, selection tables for the complete industrial line of Deming pumps, and several pages of useful information related to liquid materials handling problems.

To get a copy, circle **No. E14** on Readers' Service Card, last page this issue.

Logging Equipment Catalog

Well Instrument Developing Company has published a new catalog describing methods and equipment for logging resistance, potential, resistivity, and temperature. Complete technical data on the company's line of portable electric loggers, chart papers, and miscellaneous sub-surface tools is given.

To get a copy, circle **No. E15** on Readers' Service Card, last page this issue.

Engine Booklet

Less risk for drilling contractors is the topic of a new booklet titled "Reduced Drilling Costs With Caterpillar Oilfield Engines" published by Caterpillar Tractor Company.

Included are pictures and descriptions of drilling operations in Louisiana, Colorado, Texas, Alaska, Montana, Canada, and the Gulf of Mexico. In addition, the booklet contains testimonials by drilling contractors on their experience with cat engines.

To get a copy, circle **No. E16** on Readers' Service Card, last page this issue.

Sensator

Martin-Decker's bulletin P-10 features the E-80 Sensator, the new friction-free diaphragm-type pressure transformer for ideal wire line anchors. This brochure pictures the Martin-Decker Types "D" and "E" weight indicators and shows how the new Sensator enhances the accuracy and efficiency of these famous drilling-control instruments.

To get a copy, circle **No. E17** on Readers' Service Card, last page this issue.

Drilling Mud Emulsifier

Crossett Chemical Company has released a bulletin on its drilling mud emulsifier designed for low water loss, emulsion muds, and high drilling rate. Advantages of this mud, known as Seeco-Mul, are outlined and a record of its performance and comparison in one field in Texas is recorded in table form, giving types of mud, depth in feet, days spud to completion, total mud costs, and cost per foot. The bulletin is in color and well-illustrated.

To get a copy, circle **No. E18** on Readers' Service Card, last page this issue.

Engine Cooling System Bulletin

Cummins Engine Company has issued a bulletin, "Give the Cooling System a Chance," containing practical suggestions on the best way to care for an engine's cooling system. The information is not only for Cummins diesels, but may be applied to all internal combustion engines. Illustrated with cartoons throughout, the bulletin also contains a check-off sheet on cooling system maintenance.

To get a copy, circle **No. E19** on Readers' Service Card, last page this issue.

Circle numbers on Readers' Service Cards, last page this issue.

PORTRAIT OF A COMPANY'S OUTSTANDING SALESMAN

UTILITY — KEROSENE TYPE PAILS
Five gallon with any combination of spouts.

PAILS
Sturdily constructed — lined or plain — variety of fittings and sizes ranging from one gallon through seven.

GREASE DRUMS
100-lb. and 120-lb. capacities — all types of fittings and openings.

A Rheemcote lithographed container creates prestige and sales for your company wherever it goes. Every day your company name and trademark may be effectively displayed to new or prospective customers.
Rheemcote containers can be lithographed in any number of colors or designs, including halftones. The high gloss finish is tough and longlasting.

Sell as you ship . . . with Rheemcote Containers

You can rely on Rheem **MANUFACTURING COMPANY**

The World's Largest Manufacturer of Steel Shipping Containers

SERVING THE SOUTH AND SOUTHWEST

4901 Jefferson Highway Cedar-7331
New Orleans, Louisiana

1025 Lockwood Drive Orchard-1161
Houston, Texas

New Books, Maps and Movies

PRIMER OF OIL AND GAS PRODUCTION, Division of Production, American Petroleum Institute, 300 Corrigan Tower Building, Dallas.

This is a non-technical description and illustration of equipment and processes commonly used in production of oil and gas. It was designed to give the producer an inexpensive means of orienting inexperienced personnel. It will familiarize anyone with methods and terminology of oil and gas production and is useful for legal, accounting, stenographic and clerical personnel. Price per single copy is $1.50 with advantages offered for ordering more copies at lower price. Covers may be specially printed with the name of a company.

•

AN INTRODUCTION TO THE STUDY OF ROCK BUILDING ALGAE AND ALGAL LIMESTONES, Dr. J. Harlan Johnson, Quarterly of the Colorado School of Mines, Golden, Colo. $2.50.

This volume is an essential tool for students, petroleum geologists, and paleobotanists in recognizing various types of fossil algae and algal limestones and in interpreting their significance. One of the few studies on algae written in English, the volume will fill the demands of students having difficulty in finding literature on the subject. Copies may be secured from the Department of Publications at Golden.

•

A PRIMER OF OILWELL SERVICE AND WORKOVER, Issued by Petroleum Extension Service, The University of Texas, Austin 12, Texas.

A Primer of OILWELL SERVICE AND WORKOVER is the latest of a series of instruction handbooks published by the Petroleum Extension Service of the University of Texas, in cooperation with the American Association of Oilwell Drilling Contractors and the Texas Education Agency. Divided into the six parts, this new informative booklet is a down-to-earth treatment of the entire process of completing wells, mechanical maintenance, major repairs, recompletion and workovers and economics and planning workover jobs. It is filled with simplified diagrams and photographs to explain each step in the operation under discussion. A prologue to this series is a brief account of the fundamentals of well servicing, types and how petroleum reservoirs work, and basic concepts in well completions. Copies of this 88-page primer may be obtained from the Petroleum Extension Service, The University of Texas, Austin 12, Texas.

•

TAKE TIME TO LIVE and **IF YOU TOOK YOUR FAMILY TO WORK,** National Safety Council, 425 N. Michigan Avenue, Chicago 11, Ill

These two new safety films, prepared under the direction of the council's Industrial department, run 12 minutes each and are available in 16 mm sound movies and 35 mm sound slidefilms. The first one tells how one worker found a better way of life at a cost to himself of just five minutes a day. *If You Took Your Family to Work* demonstrates what would happen to a worker's attitude if his family actually came to the job with him. The film involves a worker and a typical day on the job.

•

THE FUNDAMENTALS OF ELECTRIC LOG INTERPRETATION, M. R. J. Wylie, Academic Press Inc., 125 East 23 Street, New York 10. $3.60.

This book is intended to explain in simple terms the underlying philosophy of electric log interpretation but not to teach interpretation procedures and techniques in any detail. The author calls attention to the existence of handbooks and interpretation charts and points out in general terms how such documents should be used and how the information they contain fits into the framework of modern methods of log interpretation. Some of the advantages and disadvantages of the different instruments now available for the logging of boreholes are discussed.

"Let's take a close look at seals," advises Scottie.
Check construction of your proposed Traveling Block.
Positive grease seals eliminate undue loss of lubricant, stop entrance of grit, sand and foreign material into bearing cavity.
Johns-Manville "Klipper" seals on all McKissick Traveling Blocks offers positive protection.
McKISSICK
McKISSICK PRODUCTS CORPORATION
Box 2496 Tulsa, Oklahoma